Nokia Customer Care

Service Manual

RM-51 (Nokia 3230)

Mobile Terminal

Part No: (9238460 (Issue 1))

Company Confidential

NOKIA

Amendment Record Sheet

Amendment No	Date	Inserted By	Comments
Original issue	02/2005	Johanna Bryman	

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IMPORTANT

This document is intended for use by qualified service personnel only.

Warnings and cautions

Warnings

- IF THE DEVICE CAN BE INSTALLED IN A VEHICLE, CARE MUST BE TAKEN ON INSTALLATION IN VEHICLES FITTED WITH ELECTRONIC ENGINE MANAGEMENT SYSTEMS AND ANTI-SKID BRAKING SYSTEMS. UNDER CERTAIN FAULT CONDITIONS, EMITTED RF ENERGY CAN AFFECT THEIR OPERATION. IF NECESSARY, CONSULT THE VEHICLE DEALER/ MANUFACTURER TO DETERMINE THE IMMUNITY OF VEHICLE ELECTRONIC SYSTEMS TO RF ENERGY.
- THE PRODUCT MUST NOT BE OPERATED IN AREAS LIKELY TO CONTAIN POTENTIALLY EXPLOSIVE ATMOSPHERES, FOR EXAMPLE, PETROL STATIONS (SERVICE STATIONS), BLASTING AREAS ETC.
- OPERATION OF ANY RADIO TRANSMITTING EQUIPMENT, INCLUDING CELLULAR TELEPHONES, MAY INTERFERE WITH THE FUNCTIONALITY OF INADEQUATELY PROTECTED MEDICAL DEVICES. CONSULT A PHYSICIAN OR THE MANUFACTURER OF THE MEDICAL DEVICE IF YOU HAVE ANY QUESTIONS. OTHER ELECTRONIC EQUIPMENT MAY ALSO BE SUBJECT TO INTERFERENCE.
- BEFORE MAKING ANY TEST CONNECTIONS, MAKE SURE YOU HAVE SWITCHED OFF ALL EQUIPMENT.

Cautions

- Servicing and alignment must be undertaken by qualified personnel only.
- Ensure all work is carried out at an anti-static workstation and that an anti-static wrist strap is worn.
- Ensure solder, wire, or foreign matter does not enter the telephone as damage may result.
- Use only approved components as specified in the parts list.
- Ensure all components, modules, screws and insulators are correctly re-fitted after servicing and alignment. Ensure all cables and wires are repositioned correctly.

  Use only approved components as specified in the parts list.
- Never test a mobile phone WCDMA transmitter with full Tx power, if there is no possibility to perform the measurements in a good performance RF-shielded room. Even low power WCDMA transmitters may disturb nearby WCDMA networks and cause problems to 3G cellular phone communication in a wide area.
- During testing never activate the GSM or WCDMA transmitter without a proper antenna load, otherwise GSM or WCDMA PA may be damaged.

For your safety

QUALIFIED SERVICE

Only qualified personnel may install or repair phone equipment.

ACCESSORIES AND BATTERIES

Use only approved accessories and batteries. Do not connect incompatible products.

CONNECTING TO OTHER DEVICES

When connecting to any other device, read its user’s guide for detailed safety instructions. Do not connect incompatible products.

Care and maintenance

This product is of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfil any warranty obligations and to enjoy this product for many years.

- Keep the phone and all its parts and accessories out of the reach of small children.
- Keep the phone dry. Precipitation, humidity and all types of liquids or moisture can contain minerals that will corrode electronic circuits.
- Do not use or store the phone in dusty, dirty areas. Its moving parts can be damaged.
- Do not store the phone in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.
- Do not store the phone in cold areas. When it warms up (to its normal temperature), moisture can form inside, which may damage electronic circuit boards.
- Do not drop, knock or shake the phone. Rough handling can break internal circuit boards.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the phone.
- Do not paint the phone. Paint can clog the moving parts and prevent proper operation.
- Use only the supplied or an approved replacement antenna. Unauthorised antennas, modifications or attachments could damage the phone and may violate regulations governing radio devices.

All of the above suggestions apply equally to the product, battery, charger or any accessory.

ESD protection

Nokia requires that service points have sufficient ESD protection (against static electricity) when servicing the phone.

Any product of which the covers are removed must be handled with ESD protection. The SIM card can be replaced without ESD protection if the product is otherwise ready for use.

To replace the covers ESD protection must be applied.

All electronic parts of the product are susceptible to ESD. Resistors, too, can be damaged by static electricity discharge.

All ESD sensitive parts must be packed in metallized protective bags during shipping and handling outside any ESD Protected Area (EPA).

Every repair action involving opening the product or handling the product components must be done under ESD protection.

ESD protected spare part packages MUST NOT be opened/closed out of an ESD Protected Area.

For more information and local requirements about ESD protection and ESD Protected Area, contact your local Nokia After Market Services representative.

Battery information

> **Note:** A new battery's full performance is achieved only after two or three complete charge and discharge cycles!

The battery can be charged and discharged hundreds of times but it will eventually wear out. When the operating time (talk-time and standby time) is noticeably shorter than normal, it is time to buy a new battery.

Use only batteries approved by the phone manufacturer and recharge the battery only with the chargers approved by the manufacturer. Unplug the charger when not in use. Do not leave the battery connected to a charger for longer than a week, since overcharging may shorten its lifetime. If left unused a fully charged battery will discharge itself over time.

Temperature extremes can affect the ability of your battery to charge.

For good operation times with Ni-Cd/NiMh batteries, discharge the battery from time to time by leaving the product switched on until it turns itself off (or by using the battery discharge facility of any approved accessory available for the product). Do not attempt to discharge the battery by any other means.

Use the battery only for its intended purpose.

Never use any charger or battery which is damaged.

Do not short-circuit the battery. Accidental short-circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery (metal strips on the battery) for example when you carry a spare battery in your pocket or purse. Short-circuiting the terminals may damage the battery or the connecting object.

Leaving the battery in hot or cold places, such as in a closed car in summer or winter conditions, will reduce the capacity and lifetime of the battery. Always try to keep the battery between 15°C and 25°C (59°F and 77°F). A phone with a hot or cold battery may temporarily not work, even when the battery is fully charged. Batteries' performance is particularly limited in temperatures well below freezing.

Do not dispose of batteries in a fire!

Dispose of batteries according to local regulations (e.g. recycling). Do not dispose as household waste.

Company Policy

Our policy is of continuous development; details of all technical modifications will be included with service bulletins.

While every endeavour has been made to ensure the accuracy of this document, some errors may exist. If any errors are found by the reader, NOKIA MOBILE PHONES Business Group should be notified in writing.

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Nokia 3230 Service Manual Structure

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2 Parts and layouts
3 Phoenix service SW
4 Service Tools
5 Disassembly and reassembly instructions
6 Baseband troubleshooting
7 RF troubleshooting
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1 — General information

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Product selection

The RM-51 is a triple band transceiver unit designed for the GSM900 (including EGSM), GSM1800 and GSM1900 networks.

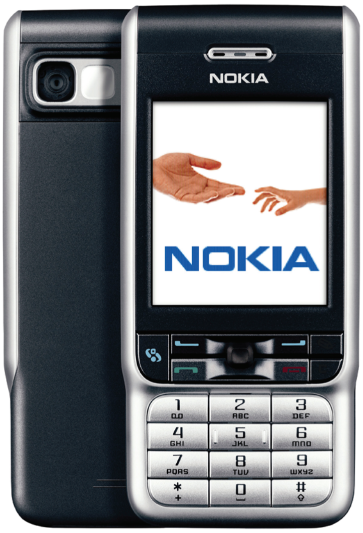

Figure 1 RM-51

Display and keypad features

- Large high resolution TFT color display (176x208 pixels) with 65,536 colors
- 2,1" (34.8mm x 41.1mm) display
- 4-way navigation key/selection key, 2 soft keys, application key, edit key and clear key
- Ribless numeric keymat
- PoC (Push To Talk) key on the side

Features

Hardware features

- GSM E900/1800/1900
- AMR/HR/FR/EFR codecs
- Internal antenna
- Ringing: 103dB from 5cm distance
- Connectors: PopPort TM and charger
- User memory: 6MB
- Memory: RS (reduced size) MMC slot
- Slot for RS MMC, 32MB RS MMC included
- Stereo FM Radio
- Mono music player (MP3)
- 1.3MP (1.22MP efficient resolution)
- GPRS: Class B, multislot class 10, EGPRS multislot class 5 downlink
- CSD: 9.6kbps and 14.4kbps
- Bluetooth: GAP SPP DUNP FXP GOEP OPP HFP FTP
- USB through PopPortTM connector
- Bluetooth through PopPortTM connector

- IrDA
- Internal vibrator
- Integrated handsfree speaker
- SIM (1.8 and 3.0 V)
- Real time clock

Software features

- OS: Symbian OS 7.0a
- UI Style: S60 v2.1
- Java: MIDP 2.0 JSR 30, 82, 118, 120, 135
- WAP: 2.0, xHTML over TCP/IP stack HTML browser
- OMA: MMS 1.1, Provisioning DRM forward lock
- PC suite (free download)

UI features

Category	Feature
Capture	• Camera with 2 modes (Standard/Night) and x4 Digital Zoom • Video Recorder supporting QCIF(176x144) and subQCIF(128x96) sizes • Video editing with MuVee
Share	• Sending via Bluetooth, MMS, e-mail, IrDA • Media Player • Print photos with Kodak BT Photokiosk and Kodak Mobile Service
Organize	• Media Gallery • Uploader
Messaging	• Multimedia Messaging with Presentations • Concatenated SMS (MO/MT) • Picture Messaging • E-mail (SMTP, IMAP4, POP3) • Instant Messaging (Wireless Village) • T9 predictive text input • Swap MMC without turning the phone off
Lifecycle	• Nokia Sensor • Lifeblog/blogging • Branded name • Moblogging
PIM	• Contacts with thumbnail images • Presence Enhanced Contact • Calendar • To-do list • Notes • Voice Recorder • Calculator • Clock • Converter

Category	Feature
Local (using PC Suite)	• Data: Calendar, Contacts • PC Applications: Microsoft Outlook (97, 98, 2000, 2002), Lotus Organizer (5.0, 6.0), Lotus Notes (5.0/5.02/6.0) • Unified PC-suite for MDO games
Remote (with SyncML server)	• Data: Calendar, Contacts
Phone	• GSM phase 2+ features • Voice dialling • Voice commands • CPHS spec. (version 4.2)
Games	• Agent V • Warrior Quest • Rally Pro Contest (multiplayer via Bluetooth)
Midp 2.0	• Mobile Media API (JSR 135) • Bluetooth API (JSR 82) • Wireless Messaging API (JSR 120)
Browser	• WAP 2.0 • xHTML/HTML browser
Personalization	• Themes • SP-MIDI • MP3
Location Based Services	• Cell broadcast
M-Commerce	• Mobile Wallet 2.0

Mobile enhancements

Power	Type
Battery 760 mAh Li-Ion	BL-5B
Retractable charger	AC-1
Charger	ACP-7
Travel charger	ACP-12
Mobile charger	LCH-12

Car accessories	Type
Headrest hands free	BHF-3
Plug-in car hands free	HF-3
Wireless car kit	CK-1W
Advanced car kit	CK-7W
Car kit	CR-10

Car accessories	Type
Mobile holder	CR-28

Carrying
Carrying case

Audio	Type
Headset	HS-5
Boom Headset	HDB-4
Fashion stereo headset	HS-3
Stereo headset (APAC)	HDS-3
FM Radio headset	HS-2R
Wireless headset	HDW-3
Wireless clip-on headset	HS-21W
Wireless boom headset	HS-4W
Wireless headset	HS-11W
Wireless image headset	HS-13W
TTY Adapter	HDA-10

Data accessories	Type
Connectivity Cable	DKU-2
Memory unit	MU-1
Memory unit	MU-2
Memory unit	MU-9
Memory unit	MU-12

Imaging accessories	Type
Image album	PD-1

Messaging accessories	Type
Digital pen	SU-1B
Wireless keyboard	SU-8W
Wireless GPS module	LD-1W

Technical specifications

General specifications

Unit	Dimension (mm)	Weight (g)	Volume (cc)
Transceiver with BL-5B 760mAh Li-Ion battery pack	109x49x16-19	110	90

Main RF characteristics for triple-band phones (Europe)

Parameter	Unit
Cellular system	GSM/EGSM900,GSM1800/1900
Rx frequency band	EGSM900: 925 - 935 MHz
	GSM900: 935 - 960MHz
	GSM1800: 1805 - 1880 MHz
	GSM1900: 1930 - 1990 MHz
Tx frequency band	EGSM900: 880 - 890MHz
	GSM900: 890 - 915MHz
	GSM1800: 1710 - 1785 MHz
	GSM1900: 1850 - 1910 MHz
Output power	GSM900: +5 ... +33dBm/3.2mW ... 2W
	GSM1800: +0 ... +30dBm/1.0mW ... 1W
	GSM1900: +0 ... +30dBm/1.0mW ... 1W
Number of RF channels	GSM900: 125
	GSM1800: 375
	GSM1900: 300
Channel spacing	200KHz
Number of Tx power levels	GSM900: 15
	GSM1800: 16
	GSM1900: 16

Battery endurance

Nokia measurements of operation times in GSM900/1800

Talk time	
Battery: BL-5B 760mAh	Up to 2,5-4 hours

Standby time	
Battery: BL-5B 760mAh	Up to 100-230 hours

Note: Variation in operation times will occur depending on SIM card, network settings and usage. Talk time is increased by up to 30% if half rate is active and reduced by 5% if enhanced full rate is active.

Environmental conditions

Environmental condition	Ambient temperature	Notes
Normal operation	15 ºC ... +55 ºC	Specifications fulfilled
Reduced performance	55 ºC ... +70 ºC	Operational only for short periods
Intermittent or no operation	-40 ºC ... -15 ºC and +70 ºC ... +85ºC	Operation not guaranteed but an attempt to operate will not damage the phone
No operation or storage	<-40 ºC and >+85 ºC	No storage. An attempt to operate may cause permanent damage
Charging allowed	-15 ºC ... +55 ºC	
Long term storage conditions	0 ºC ... +85 ºC	
Humidity and water resistance		Relative humidity range is 5 to 95%. Condensed or dripping water may cause intermittent malfunctions. Protection against dripping water has to be implemented in (enclosure) mechanics. Continuous dampness will cause permanent damage to the module.

2 — Parts and layouts

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Exploded view of Nokia RM-51

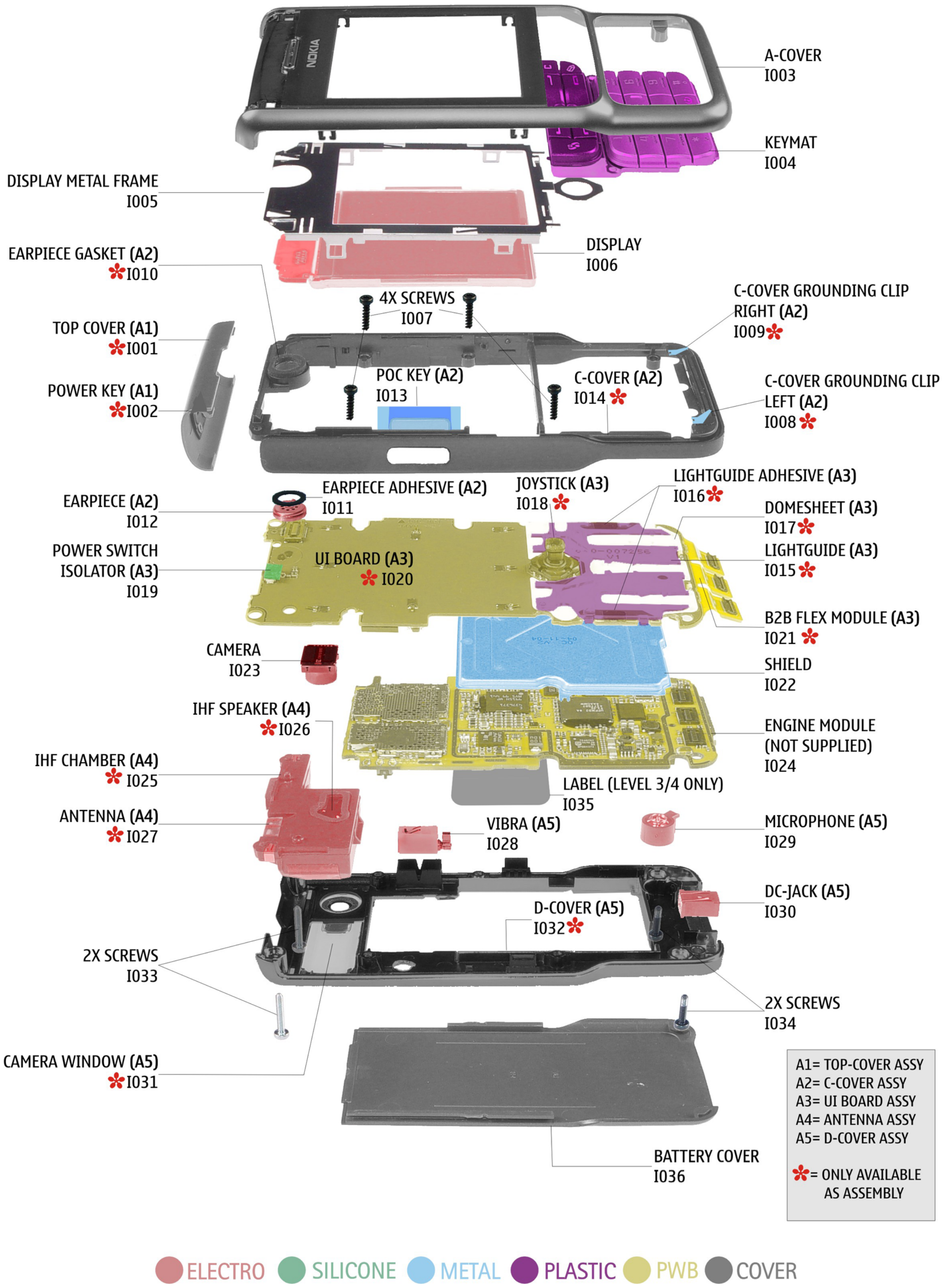
A-COVER
I003
KEYMAT
I004
DISPLAY METAL FRAME
I005
DISPLAY
I006
EARPIECE GASKET (A2)
✻I010
4X SCREWS
I007
C-COVER GROUNDING CLIP
RIGHT (A2)
I009✻
TOP COVER (A1)
✻I001
POC KEY (A2)
I013
C-COVER (A2)
I014 ✻
C-COVER GROUNDING CLIP
LEFT (A2)
I008✻
POWER KEY (A1)
✻I002
EARPIECE (A2)
I012
EARPIECE ADHESIVE (A2)
I011
JOYSTICK (A3)
I018✻
LIGHTGUIDE ADHESIVE (A3)
I016✻
DOMESHEET (A3)
I017✻
POWER SWITCH
ISOLATOR (A3)
I019
UI BOARD (A3)
✻ I020
LIGHTGUIDE (A3)
I015✻
B2B FLEX MODULE (A3)
I021 ✻
CAMERA
I023
SHIELD
I022
IHF SPEAKER (A4)
✻I026
ENGINE MODULE
(NOT SUPPLIED)
I024
IHF CHAMBER (A4)
✻ I025
LABEL (LEVEL 3/4 ONLY)
I035
ANTENNA (A4)
✻ I027
VIBRA (A5)
I028
MICROPHONE (A5)
I029
DC-JACK (A5)
I030
D-COVER (A5)
I032✻
2X SCREWS
I033
2X SCREWS
I034
CAMERA WINDOW (A5)
✻I031
BATTERY COVER
I036
A1= TOP-COVER ASSY
A2= C-COVER ASSY
A3= UI BOARD ASSY
A4= ANTENNA ASSY
A5= D-COVER ASSY
✻= ONLY AVAILABLE
AS ASSEMBLY
● ELECTRO
● SILICONE
● METAL
● PLASTIC
● PWB
● COVER

Figure 2 Exploded view of Nokia RM-51

Spare parts overview

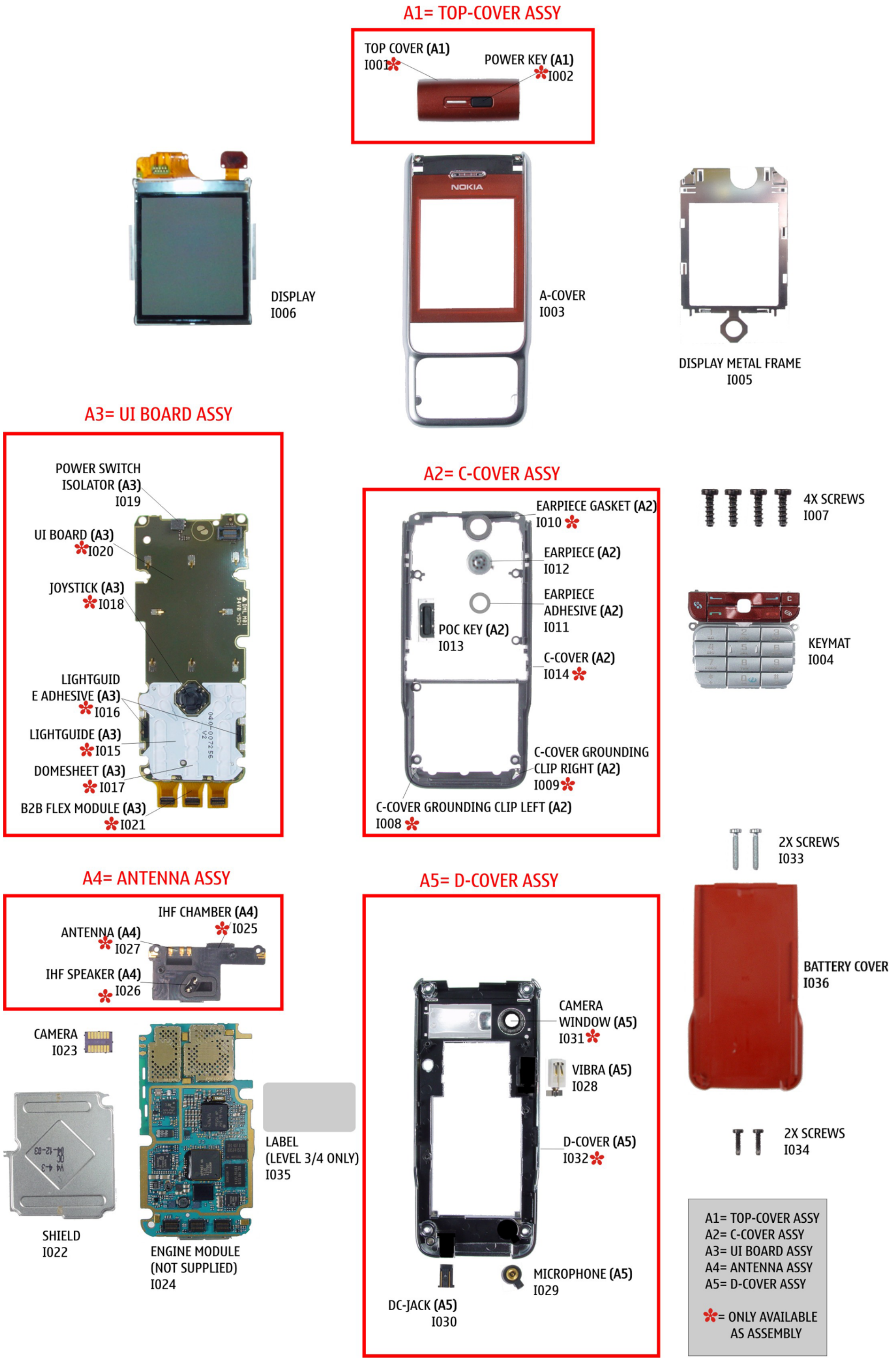
A1= TOP-COVER ASSY
TOP COVER (A1)
I001
POWER KEY (A1)
I002
DISPLAY
I006
A-COVER
I003
DISPLAY METAL FRAME
I005
A3= UI BOARD ASSY
POWER SWITCH
ISOLATOR (A3)
I019
UI BOARD (A3)
I020
JOYSTICK (A3)
I018
LIGHTGUIDE ADHESIVE (A3)
I016
LIGHTGUIDE (A3)
I015
DOMESHEET (A3)
I017
B2B FLEX MODULE (A3)
I021
A2= C-COVER ASSY
EARPIECE GASKET (A2)
I010
EARPIECE (A2)
I012
EARPIECE
ADHESIVE (A2)
I011
POC KEY (A2)
I013
C-COVER (A2)
I014
C-COVER GROUNDING
CLIP RIGHT (A2)
I009
C-COVER GROUNDING CLIP LEFT (A2)
I008
4X SCREWS
I007
KEYMAT
I004
2X SCREWS
I033
A4= ANTENNA ASSY
IHF CHAMBER (A4)
I025
ANTENNA (A4)
I027
IHF SPEAKER (A4)
I026
CAMERA
I023
SHIELD
I022
ENGINE MODULE
(NOT SUPPLIED)
I024
LABEL
(LEVEL 3/4 ONLY)
I035
A5= D-COVER ASSY
CAMERA
WINDOW (A5)
I031
VIBRA (A5)
I028
D-COVER (A5)
I032
MICROPHONE (A5)
I029
DC-JACK (A5)
I030
BATTERY COVER
I036
2X SCREWS
I034
A1= TOP-COVER ASSY
A2= C-COVER ASSY
A3= UI BOARD ASSY
A4= ANTENNA ASSY
A5= D-COVER ASSY
✻= ONLY AVAILABLE
AS ASSEMBLY

Figure 3 Spare parts overview

SWAP units

SWAP units
RM-51 SWAP EURO1 - BLACK
RM-51 SWAP EURO1 - ORANGE

SWAP units
RM-51 SWAP EURO1 - RED
RM-51 SWAP FRANCE - BLACK
RM-51 SWAP FRANCE - ORANGE
RM-51 SWAP FRANCE - RED
RM-51 SWAP GREECE - BLACK
RM-51 SWAP GREECE - ORANGE
RM-51 SWAP GREECE - RED
RM-51 SWAP GULF - BLACK
RM-51 SWAP GULF - ORANGE
RM-51 SWAP GULF - RED
RM-51 SWAP HEBREW - BLACK
RM-51 SWAP HEBREW - ORANGE
RM-51 SWAP HEBREW - RED
RM-51 SWAP RUSSIAN - BLACK
RM-51 SWAP RUSSIAN - ORANGE
RM-51 SWAP RUSSIAN - RED
RM-51 SWAP TURKEY - BLACK
RM-51 SWAP TURKEY - ORANGE
RM-51 SWAP TURKEY - RED
RM-51 SWAP UKRAINA - BLACK
RM-51 SWAP UKRAINA - ORANGE
RM-51 SWAP UKRAINA - RED
RM-51 SWAP ZA - BLACK
RM-51 SWAP ZA - ORANGE
RM-51 SWAP ZA - RED

Mechanical parts

Bold = ASSY

I0xx = ITEM codes for upper or mono block

I1xx = ITEM codes for hinge block

I2xx = ITEM codes for lower block

I3xx = ITEM codes for soldered spare parts on the upper, hinge or lower block and not exchangeable

Table 1 Mechanical parts list

ITEM/CIRCUIT REF.	QTY	PART NAME

ITEM/CIRCUIT REF.	QTY	PART NAME
	1	TOP COVER ASSY
I001	1	TOP COVER
I002	1	POWER KEY
I003	1	A-COVER
I004	1	KEYMAT
I005	1	DISPLAY METAL FRAME
I006	1	DISPLAY
I007	4	SCREWS M1.8X6
	1	C-COVER ASSY
I008	1	C-COVER GROUNDING CLIP LEFT
I009	1	C-COVER GROUNDING CLIP RIGHT
I010	1	EARPIECE GASKET
I011	1	EARPIECE ADHESIVE
I012	1	EARPIECE
I013	1	POC KEY
I014	1	C-COVER
	1	UI BOARD ASSY
I015	1	LIGHTGUIDE
I016	1	LIGHTGUIDE ADHESIVE
I017	1	DOMESHEET
I018	1	JOYSTICK
I019	1	POWER SWITCH ISOLATOR
I020	1	UI BOARD
I021	1	B2B FLEX MODULE
I022	1	SHIELD
I023	1	CAMERA
I024	1	ENGINE MODULE
	1	ANTENNA ASSY
I025	1	IHF CHAMBER
I026	1	IHF SPEAKER
I027	1	ANTENNA
	1	D-COVER ASSY
I028	1	VIBRA

ITEM/CIRCUIT REF.	QTY	PART NAME
I029	1	MICROPHONE
I030	1	DC-JACK
I031	1	Camera Window
I032	1	D-COVER
I033	2	SCREWS M1.6X10
I034	2	SCREWS M1.6X7
I035	1	LABEL
I036	1	BATTERY COVER

Component parts list

Note: This list presents the parts of 1kma_10a. For information about the latest build, please refer to the service bulletin.

Ref	Type	Name	PWB position	Assy side
A300	Shield Assembly	NSC: (No Standard Component)	F7	T
A400	Shield Assembly	PA SHIELD ASSY DMC06935 R1024	F3	T
B250	Crystal	CRYSTAL 32.768KHZ+-20PPM 12.5PF	I8	T
B440	Crystal	CER.RESON 6MHZ+0.11%-0.09% 4.5X2.	Q8	T
C132	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	P2	B
C133	Ceramic Capacitor	CHIPTCAP 100U M 10V 6.0X3.2X1.5	L3	T
C134	Ceramic Capacitor	CHIPCAP X7R 10N K 50V 0603	R6	B
C135	Ceramic Capacitor	CHIPCAP NP0 27P J 50V 0402	R5	B
C138	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	L7	T
C190	Ceramic Capacitor	CHIPCAP NP0 15P J 50V 0402	H4	T
C191	Ceramic Capacitor	CHIPCAP NP0 2P2 C 50V 0402	I3	T
C192	Ceramic Capacitor	CHIPCAP NP0 2P2 C 50V 0402	I4	T
C193	Ceramic Capacitor	CHIPCAP NP0 100P J 50V 0402	K2	T
C194	Ceramic Capacitor	CHIPCAP NP0 2P2 C 50V 0402	J3	T
C195	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	I2	T
C196	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	J3	T
C197	Ceramic Capacitor	CHIPCAP NP0 15P J 50V 0402	I4	T
C198	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	K4	T
C199	Ceramic Capacitor	CHIPCAP X5R 2U2 K 6V3 0603	K4	T
C200	Ceramic Capacitor	CHIPCAP X7R 330P J 50V 0402	I3	T
C201	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	I3	T

Ref	Type	Name	PWB position	Assy side
C203	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	K3	T
C204	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	J3	T
C220	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	I5	T
C221	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	I5	T
C222	Ceramic Capacitor	CHIPCAP X5R 10U M 6V3 0805	I5	T
C230	Ceramic Capacitor	CHIPCAP X5R 10U M 6V3 0805	P4	T
C231	Ceramic Capacitor	CHIPCAP NP0 47P J 50V 0402	P5	T
C232	Ceramic Capacitor	CHIPCAP X5R 10U M 6V3 0805	P5	T
C233	Ceramic Capacitor	CHIPCAP X5R 10U M 6V3 0805	P5	T
C239	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	04	T
C240	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	04	T
C241	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	L9	T
C242	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	04	T
C243	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	05	T
C250	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	I6	T
C251	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	J6	T
C252	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	L8	T
C253	Ceramic Capacitor	CHIPCAP NP0 10P J 50V 0402	I7	T
C254	Ceramic Capacitor	CHIPCAP NP0 10P J 50V 0402	I8	T
C255	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	H8	T
C256	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	I7	T
C257	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	I8	T
C258	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	J8	T
C259	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	J9	T
C260	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	J8	T
C261	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	K9	T
C262	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	K9	T
C263	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	I8	T
C264	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	J9	T
C265	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	J9	T
C268	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	L8	T
C269	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	L7	T
C270	Ceramic Capacitor	CHIPCAP NP0 270P J 50V 0402	L8	T
C271	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	L8	T

Ref	Type	Name	PWB position	Assy side
C272	Ceramic Capacitor	CHIPCAP X7R 1N0 K 50V 0402	H8	T
C273	Ceramic Capacitor	CHIPCAP X7R 1N0 K 50V 0402	H8	T
C274	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	I6	T
C275	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	I6	T
C276	Ceramic Capacitor	CHIPCAP X7R 1N0 K 50V 0402	I6	T
C277	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	K9	T
C278	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	I7	T
C279	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	I6	T
C280	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	H6	T
C281	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	J5	T
C282	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	K8	T
C283	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	K8	T
C284	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	L8	T
C285	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	L6	T
C286	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	K6	T
C287	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	K5	T
C288	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	K5	T
C289	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	K6	T
C290	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	K5	T
C291	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	L5	T
C292	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	J6	T
C293	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	J6	T
C294	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	J5	T
C295	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	J6	T
C296	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	J6	T
C297	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	K6	T
C298	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	K5	T
C299	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	K5	T
C300	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	J5	T
C301	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	K6	T
C302	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	K5	T
C312	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	D8	B
C314	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	E3	B
C315	Ceramic Capacitor	CHIPCAP X5R 2U2 K 10V 0805	D3	B

Ref	Type	Name	PWB position	Assy side
C316	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	E3	B
C317	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	E5	B
C340	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	Q2	T
C341	Ceramic Capacitor	CHIPCAP NP0 100P J 50V 0402	Q2	T
C354	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	S9	T
C355	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	S9	T
C356	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	S9	T
C370	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	M6	T
C371	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	M5	T
C372	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	P7	T
C373	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	N8	T
C374	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	M6	T
C375	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	N5	T
C376	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	P8	T
C377	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	M7	T
C378	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	M6	T
C379	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	N5	T
C380	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	P5	T
C381	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	P7	T
C382	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	M7	T
C383	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	N5	T
C404	Ceramic Capacitor	CHIPCAP NP0 47P J 50V 0402	P2	T
C405	Ceramic Capacitor	CHIPCAP X5R 4U7 K 6V3 0805	P3	T
C406	Ceramic Capacitor	CHIPCAP X5R 1U0 K 25V T 1.0 1206	03	T
C407	Ceramic Capacitor	CHIPCAP X5R 1U0 K 25V T 1.0 1206	02	T
C408	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	R4	T
C420	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	R7	T
C422	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	S9	T
C440	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	R9	T
C441	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	Q9	T
C442	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	P8	T
C443	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	Q9	T
C444	Ceramic Capacitor	CHIPCAP X5R 1U K 16V 0603	R8	T
C445	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	S5	B

Ref	Type	Name	PWB position	Assy side
C446	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	R6	B
C447	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	R6	B
C450	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	S3	T
C451	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	S7	T
C460	Ceramic Capacitor	CHIPCAP X7R 100N K 16V 0603	Q9	T
C461	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	P9	T
C462	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	P9	T
C463	Ceramic Capacitor	CHIPCAP X5R 470N K 10V 0603	P7	T
C464	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	P7	T
C465	Ceramic Capacitor	CHIPCAP X5R 470N K 10V 0603	P7	T
C466	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	Q7	T
C470	Ceramic Capacitor	CHIPCAP X7R 100N K 16V 0603	Q9	T
C471	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	L8	T
C472	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	L8	T
C490	Ceramic Capacitor	CHIPCAP NP0 100P J 50V 0402	L6	T
C491	Ceramic Capacitor	CHIPCAP NP0 10P J 50V 0402	05	T
C500	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	D6	T
C501	Ceramic Capacitor	CHIPCAP NP0 3P3 C 50V 0402	D6	T
C502	Ceramic Capacitor	CHIPCAP NP0 180P J 25V 0402	D7	T
C503	Ceramic Capacitor	CHIPCAP NP0 2N7 J 25V 0805	D7	T
C504	Ceramic Capacitor	CHIPCAP NP0 270P J 50V 0402	D7	T
C506	Ceramic Capacitor	CHIPCAP NP0 100P J 50V 0402	G8	T
C510	Ceramic Capacitor	CHIPCAP NP0 56P J 50V 0402	F8	T
C511	Ceramic Capacitor	CHIPCAP NP0 1P2 C 50V 0402	F7	T
C512	Ceramic Capacitor	CHIPCAP NP0 18P J 50V 0402	F8	T
C513	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	F8	T
C516	Ceramic Capacitor	CHIPCAP NP0 27P J 50V 0402	F8	T
C517	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	E7	T
C518	Ceramic Capacitor	CHIPCAP NP0 10P J 50V 0402	E6	T
C519	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	E6	T
C520	Ceramic Capacitor	CHIPCAP NP0 56P J 50V 0402	G6	T
C521	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	E6	T
C522	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	F7	T
C523	Ceramic Capacitor	CHIP ARRAY NP0 4X470P J 16V 0612	E5	T

Ref	**Type**	**Name**	**PWB position**	**Assy side**
C524	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	E5	T
C525	Ceramic Capacitor	CHIPCAP NP0 100P J 50V 0402	E7	T
C526	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	D8	T
C527	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	D8	T
C528	Ceramic Capacitor	CHIPCAP NP0 82P J 50V 0402	G6	T
C529	Ceramic Capacitor	CHIPCAP NP0 47P J 50V 0402	E7	T
C530	Ceramic Capacitor	CHIPCAP NP0 47P J 50V 0402	E7	T
C531	Ceramic Capacitor	CHIPCAP NP0 18P J 50V 0402	G6	T
C532	Ceramic Capacitor	CHIPCAP NP0 27P J 50V 0402	G6	T
C600	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	L9	T
C605	Ceramic Capacitor	CHIPCAP X5R 10U M 6V3 0805	J9	T
C606	Ceramic Capacitor	CHIPCAP X7R 33N K 10V 0402	K9	T
C607	Ceramic Capacitor	CHIPCAP X7R 33N K 10V 0402	K9	T
C608	Ceramic Capacitor	CHIPCAP X7R 1N0 K 50V 0402	K9	T
C609	Ceramic Capacitor	CHIPCAP X7R 1N0 K 50V 0402	K9	T
C611	Ceramic Capacitor	CHIPCAP NP0 10P J 50V 0402	T9	B
C612	Ceramic Capacitor	CHIPCAP NP0 10P J 50V 0402	T9	B
C617	Ceramic Capacitor	CHIPCAP X7R 3N3 J 50V 0402	S9	B
C620	Ceramic Capacitor	CHIPCAP X7R 560P J 50V 0402	Q2	T
C621	Ceramic Capacitor	CHIPCAP NP0 68P J 50V 0402	Q3	T
C622	Ceramic Capacitor	CHIPCAP X5R 470N K 10V 0603	Q2	T
C623	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	R3	T
C625	Ceramic Capacitor	CHIPCAP X7R 560P J 50V 0402	Q3	T
C629	Ceramic Capacitor	CHIPCAP X7R 3N3 J 50V 0402	R7	B
C630	Ceramic Capacitor	CHIPCAP X7R 3N3 J 50V 0402	R6	B
C632	Ceramic Capacitor	CHIPCAP X5R 10U M 6V3 0805	J9	T
C633	Ceramic Capacitor	CHIPCAP X7R 33N K 10V 0402	J9	T
C634	Ceramic Capacitor	CHIPCAP X7R 33N K 10V 0402	J9	T
C638	Ceramic Capacitor	CHIPCAP X7R 3N3 J 50V 0402	R7	B
C639	Ceramic Capacitor	CHIPCAP X7R 3N3 J 50V 0402	R7	B
C657	Ceramic Capacitor	CHIPCAP X7R 10N J 16V 0402	M4	T
C658	Ceramic Capacitor	CHIPCAP X7R 47N K 10V 0402	M4	T
C659	Ceramic Capacitor	CHIPCAP X7R 22N K 16V 0402	M2	T
C661	Ceramic Capacitor	CHIPCAP X7R 1N0 K 50V 0402	02	T

Ref	Type	Name	PWB position	Assy side
C662	Ceramic Capacitor	CHIPCAP X7R 22N K 16V 0402	M3	T
C663	Ceramic Capacitor	CHIPCAP X7R 47N K 10V 0402	O4	T
C664	Ceramic Capacitor	CHIPCAP X7R 22N K 16V 0402	N2	T
C665	Ceramic Capacitor	CHIPCAP X7R 33N K 10V 0402	O3	T
C666	Ceramic Capacitor	CHIPCAP X7R 47N K 10V 0402	O4	T
C667	Ceramic Capacitor	CHIPCAP NP0 100P J 50V 0402	N4	T
C668	Ceramic Capacitor	CHIPCAP X7R 33N K 10V 0402	O4	T
C669	Ceramic Capacitor	CHIPCAP X7R 47N K 10V 0402	O4	T
C670	Ceramic Capacitor	CHIPCAP X7R 4N7 K 25V 0402	M4	T
C671	Ceramic Capacitor	CHIPCAP X7R 22N K 16V 0402	N4	T
C672	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	N4	T
C673	Ceramic Capacitor	CHIPCAP X7R 22N K 16V 0402	O2	T
C674	Ceramic Capacitor	CHIPCAP NP0 100P J 50V 0402	N2	T
C678	Ceramic Capacitor	CHIPCAP NP0 27P J 50V 0402	N4	T
C679	Ceramic Capacitor	CHIPCAP NP0 47P J 50V 0402	M4	T
C680	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	O3	T
C682	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	O3	T
C684	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	O3	T
C685	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	O3	T
C693	Ceramic Capacitor	CHIPCAP X7R 3N3 J 50V 0402	S8	B
C696	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	E5	B
C697	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	Q3	T
C698	Ceramic Capacitor	CHIPCAP X7R 22N K 16V 0402	Q3	T
C702	Ceramic Capacitor	CHIPCAP X7R 1N0 J 50V 0402	F3	T
C703	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	F3	T
C704	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	F4	T
C705	Ceramic Capacitor	CHIPCAP X5R 4U7 K 6V3 0805	G3	T
C706	Ceramic Capacitor	CHIPCAP NP0 27P J 50V 0402	G4	T
C707	Ceramic Capacitor	CHIPCAP NP0 1P2 C 50V 0402	G3	T
C710	Ceramic Capacitor	CHIPCAP X7R 1N0 J 50V 0402	F4	T
C711	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	G3	T
C712	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	G3	T
C713	Ceramic Capacitor	CHIPCAP NP0 15P J 50V 0402	G7	T
C714	Ceramic Capacitor	CHIPCAP NP0 15P J 50V 0402	G7	T

Ref	Type	Name	PWB position	Assy side
C716	Ceramic Capacitor	CHIPCAP X7R 10N K 16V 0402	G4	T
C750	Ceramic Capacitor	CHIPCAP X5R 4U7 K 6V3 0805	N10	B
C751	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	Q10	B
C752	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	Q10	B
C753	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	Q9	B
C800	Ceramic Capacitor	CHIPCAP NP0 100P J 50V 0402	D4	T
C801	Ceramic Capacitor	CHIPCAP NP0 2P2 C 50V 0402	D3	T
C802	Ceramic Capacitor	CHIPCAP X5R 100N K 10V 0402	D4	T
C803	Ceramic Capacitor	CHIPCAP NP0 15P J 50V 0402	D4	T
C804	Ceramic Capacitor	CHIPCAP NP0 1P2 C 50V 0402	E4	T
C805	Ceramic Capacitor	CHIPCAP NP0 15P J 50V 0402	G6	T
C806	Ceramic Capacitor	CHIPCAP NP0 15P J 50V 0402	G6	T
C862	Ceramic Capacitor	CHIPCAP X7R 22N K 16V 0402	Q3	T
C863	Ceramic Capacitor	CHIPCAP NP0 100P J 50V 0402	Q2	T
C905	Ceramic Capacitor	CHIPCAP NP0 10P J 50V 0402	M7	T
C933	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	R4	T
C934	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	R3	T
C935	Ceramic Capacitor	CHIPCAP NP0 22P J 50V 0402	Q9	T
C936	Ceramic Capacitor	CHIPCAP NP0 270P J 50V 0402	R6	B
C940	Ceramic Capacitor	CHIPCAP X5R 1U K 6V3 0603	L7	T
C941	Ceramic Capacitor	CHIPCAP NP0 2N2 J 16V 0603	G8	T
C943	Ceramic Capacitor	CHIPCAP NP0 47P J 50V 0402	G3	T
C948	Ceramic Capacitor	CHIPCAP NP0 1N0 J 50V 0603	G8	T
D190	Mixed Signal ASIC	TJA4 BLUETOOTH DEVICE	J4	T
D190	Mixed Signal ASIC	TJA4 BLUETOOTH DEVICE	J4	T
D191	Logic IC	1XINV 1.8-5.5V SC70-5	J3	T
D250	Mixed Signal ASIC	UEMEK2v0 LF WDENA TFBGA244	K7	T
D370	Digital ASIC	UPP_WD2-V3.2E F751748B UBGA240	N6	T
D400	Power Management IC	DC/DC CONV 350MA(TK11851)SOP8	P3	T
D440	Interface IC	KAEDE V1.0 ISP1182 HVQFN32	Q9	T
D460		NOR 128M + 128M 1.8/1.8V FGBA44 P	O9	T
D461		SDRAM NMP 128MBIT 133MHZ PBFREE	P6	T
D462	FLASH Memory	FLASH 4MX16 1V8/1V8 VFBGA44 PBFRE	M9	T

Ref	Type	Name	PWB position	Assy side
F130	Fuse And Protector	SM FUSE F 1.5A 32V ROHS-FREE 0603	S4	B
G500	VCO	VCO 3296-3980MHZ 4-BAND Matsushit	D6	T
G501	VCTCXO	VCTCXO 26MHZ+-3PPM 2.7V 1.3MA GSM	E8	T
G502		CELL CAPACITOR 0.015MAH 3V3	M10	B
J800		NSC: (No Standard Component)	D2	T
J801		NSC: (No Standard Component)	E2	T
J802		NSC: (No Standard Component)	E2	T
L130	EMC Component	FERR.BEAD 0R03 42R/100MHZ 3A 0805	S5	B
L131	EMC Component	FERR.BEAD 240R/100M 0.4A 0R3 0402	R6	B
L133	EMC Component	FERR.BEAD 240R/100M 0.4A 0R3 0402	R6	B
L190	Fixed Inductor	CHIP COIL 22N J Q28/800MHZ 0402	I4	T
L191	Fixed Inductor	CHIP COIL 2N7 +-0N3 Q29/800M 0402	I4	T
L192	Fixed Inductor	CHIP COIL 2N7 +-0N3 Q29/800M 0402	I4	T
L193	Fixed Inductor	CHIP COIL 22N J Q28/800MHZ 0402	I3	T
L194	Fixed Inductor	CHIP COIL 22N J Q28/800MHZ 0402	I3	T
L220	EMC Component	FERRITE BEAD 0R5 600R/100MHZ 0603	I5	T
L221	EMC Component	FERRITE BEAD 0R5 600R/100MHZ 0603	I5	T
L222	EMC Component	FERRITE BEAD 0R5 600R/100MHZ 0603	I5	T
L230	Fixed Inductor	CHOKE 10uH M 0.53A 0R48 4.8x4.8x1	Q5	T
L400	EMC Component	FERRITE BEAD 0R5 600R/100MHZ 0603	P3	T
L401	Fixed Inductor	CHOKE 22U M 0.33A 1R5 3.3X3.3X1.3	P4	T
L440	EMC Component	FERR.BEAD 240R/100M 0.4A 0R3 0402	S6	B
L441	Fixed Inductor	CHIP COIL 56N J Q21/800MHZ 0402	S6	B
L442	Fixed Inductor	CHIP COIL 56N J Q21/800MHZ 0402	S6	B
L500	Fixed Inductor	CHIP COIL 5N6 +-0N3 Q7/100M 0402	F8	T
L501	Fixed Inductor	CHIP COIL 5N6 +-0N3 Q7/100M 0402	F8	T
L502	Fixed Inductor	CHIP COIL 3N3 +-0N1 Q30/1GHZ 0402	F8	T
L503	Fixed Inductor	CHIP COIL 3N3 +-0N1 Q30/1GHZ 0402	F8	T
L504	Fixed Inductor	CHIP COIL 3N9 +-0N1 Q28/1GHZ 0402	F7	T
L505	Fixed Inductor	CHIP COIL 3N3 +-0N1 Q30/1GHZ 0402	D6	T
L622	Fixed Inductor	CHIP COIL 68NH J Q12/100MHZ 0603	S10	B
L656	Fixed Inductor	CHIP COIL 33N G Q40/250MHZ 0603	M3	T
L657	Fixed Inductor	CHIP COIL 33N G Q40/250MHZ 0603	M3	T
L658	Fixed Inductor	CHIP COIL 120N J Q16/100MHZ 0603	N4	T

Ref	Type	Name	PWB position	Assy side
L677	EMC Component	CHIP BEAD ARRAY 2X1000R 0405	S7	B
L678	EMC Component	CHIP BEAD ARRAY 2X1000R 0405	S9	B
L679	EMC Component	CHIP BEAD ARRAY 2X1000R 0405	R7	B
L700	EMC Component	FERR.BEAD 0R03 42R/100MHZ 3A 0805	G4	T
L702	Fixed Inductor	CHIP COIL 33N J Q23/800MHZ 0402	G7	T
L800	Fixed Inductor	CHIP COIL 3N3 +-0N3 Q28/800M 0402	D3	T
L801	Fixed Inductor	CHIP COIL 3N3 +-0N3 Q28/800M 0402	E4	T
L802	Fixed Inductor	CHIP COIL 4N7 +-0N1 Q29/1GHZ 0402	F6	T
L803	Fixed Inductor	CHIP COIL 4N7 +-0N1 Q29/1GHZ 0402	F6	T
L804	Fixed Inductor	CHIP COIL 18N J Q29/800MHZ 0402	F6	T
L805	Fixed Inductor	CHIP COIL 18N J Q29/800MHZ 0402	F6	T
L807	Fixed Inductor	CHIP COIL 8N2 J Q28/800MHZ 0402	G6	T
L836	EMC Component	CHIP BEAD ARRAY 2X1000R 0405	S9	T
L839	Fixed Inductor	CHIP COIL 3N9 +-0N3 Q28/800M 0402	G3	T
N130	Power Management IC	CURRNT SENS LM3820 USMD10 PB-FREE	P2	B
N230	Power Management IC	DC/DC 1.8V/1.5V(LM2608-1.8)USMD10	P4	T
N233		NSC: (No Standard Component)	04	T
N234		NSC: (No Standard Component)	05	T
N310	Other IC	VREG & LEVELSHIFT(LP3928)USMD16	D3	B
N500	RF ASIC	HELGO86G Line TFD8 TFBGA88	F7	T
N656	Other IC	FM RECEIVER(TEA5767HN) LQFP40	N3	T
N661	Other IC	VREG & LEVELSHIFT(LP3928)USMD16	L5	T
N662	Analog IC	AF AMP 0.4W LM4890/NCP2890 PBFREE	Q3	T
N700	Power Amplifier	PW AMP RF9250E4.1 Micro GSM/EDGE	F3	T
N750	Infrared	IRDA 1.15Mbps 2.2mm RoHS	P10	B
R130	Fixed Resistor	CHIPRES 0W06 2K2 J 0402	Q2	B
R131	Fixed Resistor	CHIPRES 0W06 2K2 J 0402	Q2	B
R132	Variable Resistor	NTC RES 0W1 47K J B 4050+-3% 0402	J10	B
R133	Fixed Resistor	CHIPRES 0W06 100K J 0402	L7	T
R134	Fixed Resistor	CHIPRES 0W06 100K J 0402	Q6	B
R192	Fixed Resistor	CHIPRES 0W06 2K7 J 0402	I3	T
R193	Fixed Resistor	CHIPRES 0W06 10K J 0402	J3	T
R194	Fixed Resistor	CHIPRES 0W06 2R2 J 0402	I3	T

Ref	Type	Name	PWB position	Assy side
R195	Fixed Resistor	CHIPRES 0W06 10K J 0402	K4	T
R200	Fixed Resistor	CHIPRES JUMPER 0R0 0402	K3	T
R252	Fixed Resistor	CHIPRES 0W06 100K J 0402	L8	T
R253	Fixed Resistor	CHIPRES 0W06 100K F 200PPM 0402	L8	T
R254	Fixed Resistor	CHIPRES 0W06 100K F 200PPM 0402	I8	T
R255	Fixed Resistor	CHIPRES 0W06 39K J 0402	H8	T
R257	Fixed Resistor	CHIPRES 0W06 220R J 0402	L7	T
R259	Fixed Resistor	CHIPRES 0W25 0R22 J 0805	I6	T
R260	Fixed Resistor	CHIPRES 0W06 27K F 0402	K6	T
R261	Integrated Discretes	ASIP 4XESD *** PB-FREE *** BGA5	K10	B
R270	Fixed Resistor	CHIPRES 0W06 4K7 J 0402	I8	T
R310	Integrated Discretes	ASIP SIM INTERFACE ** PB-FREE **	E4	B
R313	Fixed Resistor	CHIPRES 0W06 18K J 0402	E4	B
R315	Integrated Discretes	ASIP MMC FILTER *** PB-FREE ***	E5	B
R371	Fixed Resistor	CHIPRES 0W06 18K J 0402	M7	T
R400	Fixed Resistor	CHIPRES 0W06 10K J 0402	Q4	T
R402	Fixed Resistor	CHIPRES 0W06 100R J 0402	S5	T
R403	Variable Resistor	CHIP VARISTOR VWM15V VC50V 0402	S5	T
R404	Fixed Resistor	CHIPRES 0W06 100R J 0402	M5	T
R405	Fixed Resistor	CHIPRES 0W06 100R J 0402	M5	T
R406	Fixed Resistor	CHIPRES 0W06 560R J 0402	S3	T
R419	Fixed Resistor	CHIPRES 0W06 100K J 0402	Q3	T
R420	Fixed Resistor	CHIPRES 0W06 3K9 J 0402	M5	T
R421	Fixed Resistor	CHIPRES 0W06 3K9 J 0402	M5	T
R422	Fixed Resistor	CHIPRES 0W06 100R J 0402	M8	T
R423	Fixed Resistor	CHIPRES 0W06 100R J 0402	M8	T
R426	Fixed Resistor	CHIPRES 0W06 47R J 0402	M7	T
R446	Fixed Resistor	CHIPRES 0W06 33R J 0402	R6	B
R447	Fixed Resistor	CHIPRES 0W06 68R J 0402	R8	T
R448	Fixed Resistor	CHIPRES 0W06 68R J 0402	R8	T
R450	Variable Resistor	CHIP VARISTOR VWM15V VC50V 0402	S6	B

Ref	Type	Name	PWB position	Assy side
R451	Integrated Discretes	ASIP USB2 FILTER BGA10 PBFREE	R6	B
R452	Fixed Resistor	CHIPRES 0W06 220K J 0402	R9	T
R465	Fixed Resistor	CHIPRES 0W06 4K7 J 0402	N5	T
R470	Fixed Resistor	CHIPRES JUMPER 0R0 0402	L8	T
R490	Fixed Resistor	CHIPRES 0W06 10K J 0402	K6	T
R491	Fixed Resistor	CHIPRES 0W06 680R J 0402	05	T
R492	Fixed Resistor	CHIPRES 0W06 100R J 0402	05	T
R501	Fixed Resistor	CHIPRES 0W06 5K6 J 0402	D7	T
R502	Fixed Resistor	CHIPRES 0W06 6K8 F 0402	D7	T
R503	Resistor Network	RES NETWORK 0W04 2DB ATT 0404	D7	T
R504	Fixed Resistor	CHIPRES 0W06 4K7 J 0402	G8	T
R505	Fixed Resistor	CHIPRES 0W06 4K7 J 0402	G8	T
R506	Fixed Resistor	CHIPRES 0W06 22K J 0402	G8	T
R511	Fixed Resistor	CHIPRES 0W06 4K7 J 0402	E5	T
R512	Fixed Resistor	CHIPRES 0W06 5K6 F 0402	E6	T
R513	Fixed Resistor	CHIPRES 0W06 15K J 0402	D8	T
R514	Fixed Resistor	CHIPRES 0W06 15K J 0402	G6	T
R515	Resistor Network	RES NETWORK 0W06 4X5K6 J 0804	E7	T
R516	Fixed Resistor	CHIPRES 0W06 10R J 0402	F8	T
R519	Fixed Resistor	CHIPRES JUMPER 0R0 0402	F8	T
R602	Fixed Resistor	CHIPRES 0W06 1K0 J 0402	K9	T
R603	Fixed Resistor	CHIPRES 0W06 1K0 J 0402	K9	T
R604	Fixed Resistor	CHIPRES 0W06 470R J 0402	J9	T
R605	Fixed Resistor	CHIPRES 0W06 2K2 J 0402	K9	T
R606	Fixed Resistor	CHIPRES 0W06 2K2 J 0402	K9	T
R607	Fixed Resistor	CHIPRES 0W06 1K0 J 0402	K9	T
R608	Fixed Resistor	CHIPRES 0W06 1K0 J 0402	J9	T
R622	Fixed Resistor	CHIPRES 0W06 2K2 J 0402	S7	T
R628	Fixed Resistor	CHIPRES 0W06 470R J 0402	I8	T
R629	Fixed Resistor	CHIPRES 0W06 1K0 J 0402	J9	T
R630	Fixed Resistor	CHIPRES 0W06 1K0 J 0402	J9	T
R631	Fixed Resistor	CHIPRES 0W06 100K J 0402	I9	T
R634	Resistor Network	RES NETWORK 0W06 2X10R J 0404	S9	B

Ref	Type	Name	PWB position	Assy side
R635	Integrated Discretes	ASIP MIC W/ESD RES+CAP+ZDI BGA11	R7	B
R640	Fixed Resistor	CHIPRES 0W06 4K7 J 0402	K3	T
R642	Fixed Resistor	CHIPRES 0W06 18K J 0402	Q3	T
R644	Fixed Resistor	CHIPRES 0W06 27K J 0402	Q3	T
R646	Variable Resistor	VAR.ARRAY 2X16V 824-915MHZ 0405	S9	T
R648	Variable Resistor	VAR.ARRAY 2X16V 824-915MHZ 0405	S9	B
R649	Variable Resistor	VAR.ARRAY 2X16V 824-915MHZ 0405	R7	B
R651	Resistor Network	RES NETWORK 0W03 4X22R J 0804	L10	B
R652	Fixed Resistor	CHIPRES 0W06 220R J 0402	K10	B
R653	Resistor Network	RES NETWORK 0W06 2X10R J 0404	R7	B
R655	Variable Resistor	VAR.ARRAY 2X16V 824-915MHZ 0405	S9	B
R656	Fixed Resistor	CHIPRES 0W06 12R J 0402	M2	T
R657	Fixed Resistor	CHIPRES 0W06 33K J 0402	M3	T
R658	Fixed Resistor	CHIPRES 0W06 47R J 0402	M3	T
R659	Fixed Resistor	CHIPRES 0W06 10K J 0402	M4	T
R660	Fixed Resistor	CHIPRES 0W06 100K J 0402	M4	T
R662	Fixed Resistor	CHIPRES 0W06 5R6 J 0402	N4	T
R663	Fixed Resistor	CHIPRES 0W06 10K J 0402	M2	T
R664	Fixed Resistor	CHIPRES 0W06 220K J 0402	N2	T
R665	Fixed Resistor	CHIPRES 0W06 100K J 0402	N2	T
R667	Fixed Resistor	CHIPRES 0W06 18K F 100PPM 0603	N4	T
R669	Fixed Resistor	CHIPRES 0W06 33K J 0402	N2	T
R675	Fixed Resistor	CHIPRES 0W06 27K J 0402	Q3	T
R687	Fixed Resistor	CHIPRES 0W06 10K J 0402	L5	T
R689	Fixed Resistor	CHIPRES JUMPER 0R0 0402	L4	T
R690	Fixed Resistor	CHIPRES JUMPER 0R0 0402	L4	T
R691	Fixed Resistor	CHIPRES JUMPER 0R0 0402	L4	T
R693	Fixed Resistor	CHIPRES 0W06 1M0 J 0402	J3	T
R697	Resistor Network	RES NETWORK 0W06 2X10R J 0404	S9	T
R701	Fixed Resistor	CHIPRES 0W06 1K0 J 0402	F3	T
R702	Fixed Resistor	CHIPRES 0W06 4K7 J 0402	F4	T
R703	Fixed Resistor	CHIPRES JUMPER 0R0 0402	F4	T
R713	Fixed Resistor	CHIPRES 0W06 33R J 0402	G3	T

Ref	Type	Name	PWB position	Assy side
R715	Fixed Resistor	CHIPRES 0W06 33R J 0402	G3	T
R717	Resistor Network	RES NETWORK 0W04 1DB ATT 0404	G3	T
R718	Resistor Network	RES NETWORK 0W04 1DB ATT 0404	G4	T
R750	Fixed Resistor	CHIPRES 0W5 4R7 J 200PPM 1210	O10	B
R800	Fixed Resistor	CHIPRES 0W06 3K3 J 0402	D4	T
R801	Fixed Resistor	CHIPRES 0W06 10R J 0402	E4	T
R802	Fixed Resistor	CHIPRES 0W06 560R J 0402	E4	T
R809	Variable Resistor	CHIP VARISTOR VWM15V VC50V 0402	S3	T
R859	Fixed Resistor	CHIPRES 0W06 33K J 0402	J9	T
R861	Fixed Resistor	CHIPRES 0W06 18K J 0402	Q3	T
R865	Fixed Resistor	CHIPRES 0W06 33R J 0402	Q4	T
R866	Fixed Resistor	CHIPRES 0W06 100K J 0402	E3	B
R870	Fixed Resistor	CHIPRES 0W06 220R J 0402	K10	B
R871	Fixed Resistor	CHIPRES 0W06 100R J 0402	Q6	B
R872	Fixed Resistor	CHIPRES 0W06 470R J 0402	J9	T
R937	Fixed Resistor	CHIPRES 0W06 33K J 0402	K9	T
R938	Fixed Resistor	CHIPRES 0W06 1M0 J 0402	S7	T
R942	Fixed Resistor	CHIPRES 0W06 10K J 0402	G8	T
R943	Fixed Resistor	CHIPRES 0W06 100R J 0402	G8	T
R944	Fixed Resistor	CHIPRES 0W06 100R J 0402	G8	T
R947	Fixed Resistor	CHIPRES JUMPER 0R0 0402	F3	T
R948	Fixed Resistor	CHIPRES JUMPER 0R0 0402	F4	T
S001		SWITCH MMC	E2	B
T500	Balun	TRANSF BALUN 3290-3980MHZ	D7	T
T700	Balun	TRANSF BALUN 1800+-100MHZ 2X1.25	G7	T
T800	Transformer	TRANSF BALUN 1.9GHZ+-100MHZ2X1.25	G5	T
V130	Diode	TVS DI 1PMT16AT3 16V 175W PWRMITE	R5	B
V400	Integrated Discretes	ASIP EMI/ESD FILTER BGA6	Q3	T
V401	Integrated Discretes	ASIP EMI/ESD FILTER BGA6	Q3	T
V402	Diode	SCH DIODE 30V 200MA VF 0V5 SOD523	P3	T
V615	Bipolar Transistor BJT	TR 2SC5658QRS N 50V 0A1 0W15 VMT3	S7	T
V656	Diode	CAP.DI BB202 CT 2.5 FM 0R8 SOD523	M4	T

Ref	Type	Name	PWB position	Assy side
V657	Diode	CAP.DI BB202 CT 2.5 FM 0R8 SOD523	M4	T
V800	Bipolar Transistor BJT	TR BGA428 LNA1.8GHZ 19.5DB SOT363	D4	T
X001	Other Mechanical Component	NSC: (No Standard Component)	D8	T
X002	Other Mechanical Component	NSC: (No Standard Component)	D5	T
X003	Other Mechanical Component	NSC: (No Standard Component)	H5	T
X004	Other Mechanical Component	NSC: (No Standard Component)	R3	T
X005	Other Mechanical Component	NSC: (No Standard Component)	S9	T
X131	Battery Connector	SM BATTERY CONN 3POLE SPR	R4	B
X132	System Connector	SM SYSTEM CONNECTOR 14POL	S6	B
X820		SIM/MMC combo reader P2103	F6	B
X821	Other Customized Connector	MODULE ID COMPONENT 2.8X1.8X0.3	J10	B
Z191	Ceramic Filter	CER FILT 2441+-41.75MHZ 2.7X2.2	I3	T
Z192	Balun	TRANSF BALUN 2400+/-100MHZ	I4	T
Z402	Integrated Discretes	ASIP 10-CH ESD EMI FILTER BGA25	Q4	T
Z700	SAW Filter	SAW FILT 897.5+-17.5MHZ/3DB 2X1.6	G7	T
Z800	Antenna Switch	DIPL+3SW824-960/1710-1990MHZ5.4*4	E3	T
Z801	SAW Filter	SAW FILT 1960+-30MHZ/3.5DB 2X1.6	D3	T
Z802	SAW Filter	SAW FILT 1842.5+-37.5MHZ 2X1.6	F5	T
Z803	SAW Filter	SAW FILT 942.5+-17.5MHZ/3DB 2X1.6	F5	T
Z814	Integrated Discretes	ASIP 10-CH ESD EMI FILTER BGA25	Q6	T

Component layouts

Note: See also A3 size layouts in Schematics chapter: bottom (Page) and top (Page).

Component layout, bottom

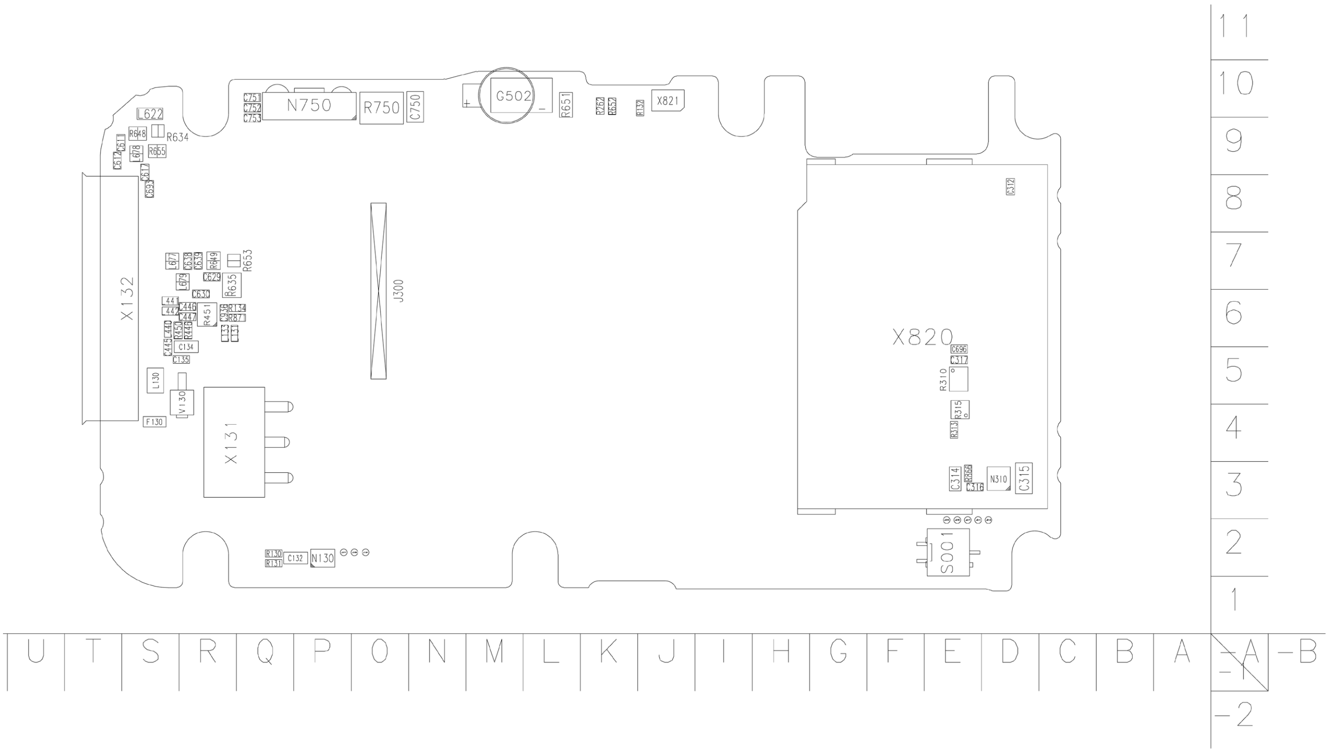
N750
R750
C750
G502
X821
L622
X132
J300
X131
X820
N130
S001
N310
C315
11
10
9
8
7
6
5
4
3
2
1
-1
-2
U T S R Q P O N M L K J I H G F E D C B A -A -B

Figure 4 Component layout, bottom

Component layout, top

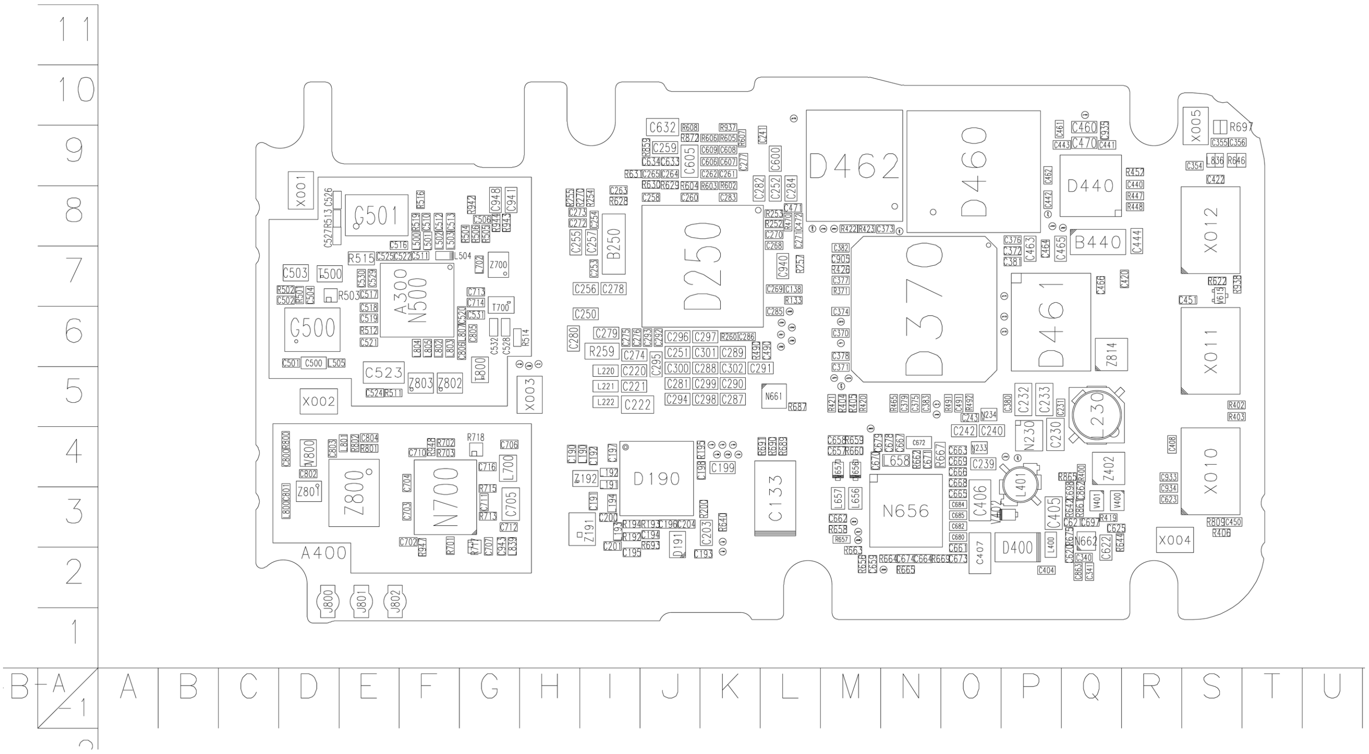
X001
G501
G500
A300
N500
X002
C523
Z803
Z802
X003
B250
D250
D462
D460
D440
B440
D370
D461
X005
X012
X011
X010
X004
N800
Z800
N700
A400
L700
J800
J801
J802
D190
C133
N656
D400
C406
L401
Z402
C230
N230
N662
11
10
9
8
7
6
5
4
3
2
1
-1
-2
B A A B C D E F G H I J K L M N O P Q R S T U

Figure 5 Component layout, top

3 — Phoenix service SW

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Service software installation

Phoenix installation steps in brief

Phoenix is the DCT-4 generation service software for reprogramming, testing and tuning the phone.

To install Phoenix, you need to:

- Connect a DK2 Dongle or FLS-4S POS Flash Device
- Install the Phoenix Service SW
- Install the Data Package for Phoenix
- Configure users
- Manage connection settings (depends on the tools you are using)

Phoenix is now ready for FLS-4S Point Of Sales Flash Device use.

If you use FPS-8:

- Update FPS-8 SW
- Activate FPS-8
- Update JBV-1 Docking Station SW (only when needed)

Phoenix is now ready to be used with FPS-8 flash prommer and other tools as well.

The Phoenix Service Software installation contains:

- Service software support for all phone models included in the package
- Flash update package files for FPS-8* and FLS-4S programming devices
- All needed drivers for:
  - DK2 dongle
  - FLS-4S point of sales flash device
  - USB devices

Note: Separate installation packages for flash update files and drivers are also available, but it is not necessary to use them unless updates appear between Phoenix Service SW releases. If separate update packages are used, they should be used after Phoenix and data packages have been installed.

Supported operating systems

- Windows 2000 and XP.

Hardware requirements for using Phoenix

- Minimum: Processor 300 MHz, RAM memory 64 MB, disk space 100 MB.
- Recommended for Windows 2000: Processor 700 MHz, RAM memory 256 MB, disk space 150 MB.

Installing Phoenix

Before you begin

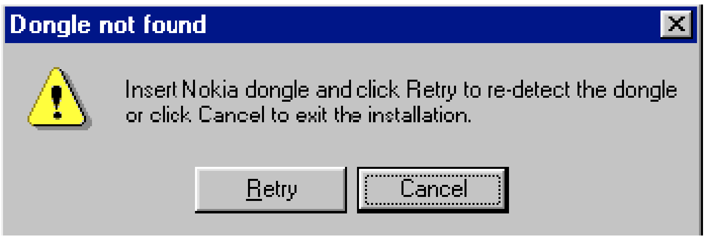
- Check that a Dongle is attached to the parallel port of your computer.
- Download the installation package (for example, *phoenix_service_sw_a15_2004_24_7_55.exe*) to your computer (in *C:\TEMP*, for instance).
- Close all other programs.
- Run the application file (for example, *phoenix_service_sw_a15_2004_24_7_55.exe*) and follow the instructions on the screen.

Note: Administrator rights may be required to be able to install Phoenix depending on the operating system.

If uninstalling or rebooting is needed at any point, you will be prompted by the Install Shield program.

Context

If at any point during installation you get this message, Dongle is not found and installation cannot continue:



Dongle not found

Insert Nokia dongle and click Retry to re-detect the dongle or click Cancel to exit the installation.

Figure 6 Dongle not found

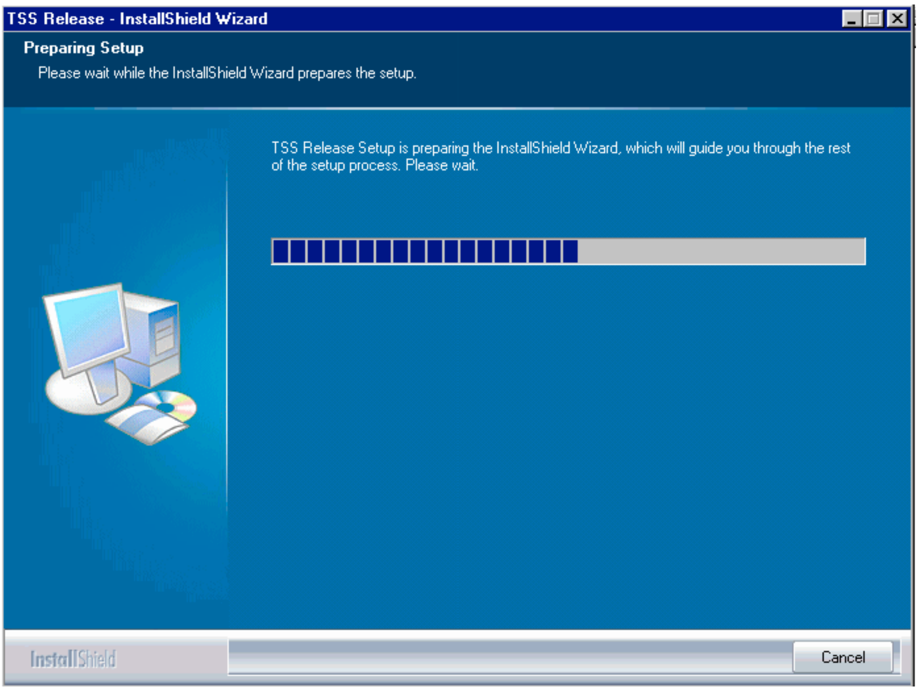
Possible reasons may be a defective or too old PKD-1 Dongle (a new dongle has a six digit serial number).

Check the COM/parallel ports used first! After correcting the problem the installation can be restarted.

For more detailed information, please refer to Phoenix Help files. Each feature in Phoenix has its own Help function, which can be activated while running the program. Press the *F1* key or the *Help* button to activate a Help file.

Steps

1. Run the *phoenix_service_sw_a15_2004_24_7_55.exe* to start installation. Install Shield prepared the setup.



TSS Release - InstallShield Wizard

Preparing Setup

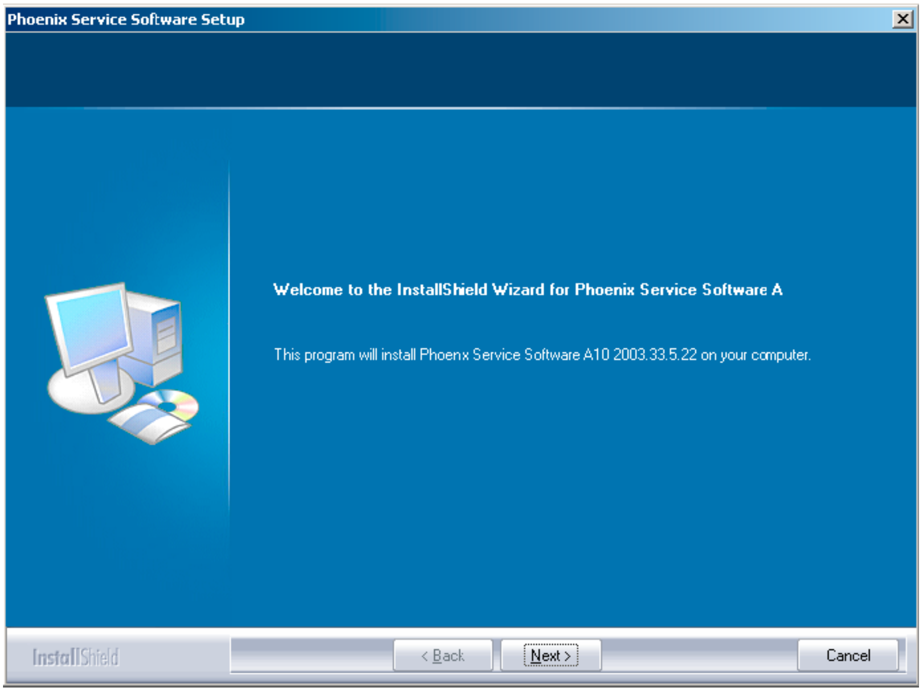
Please wait while the InstallShield Wizard prepares the setup.

TSS Release Setup is preparing the InstallShield Wizard, which will guide you through the rest of the setup process. Please wait.

Figure 7 Preparing setup

Install Shield will prepare.

2. Click *Next* in Welcome dialog to continue.

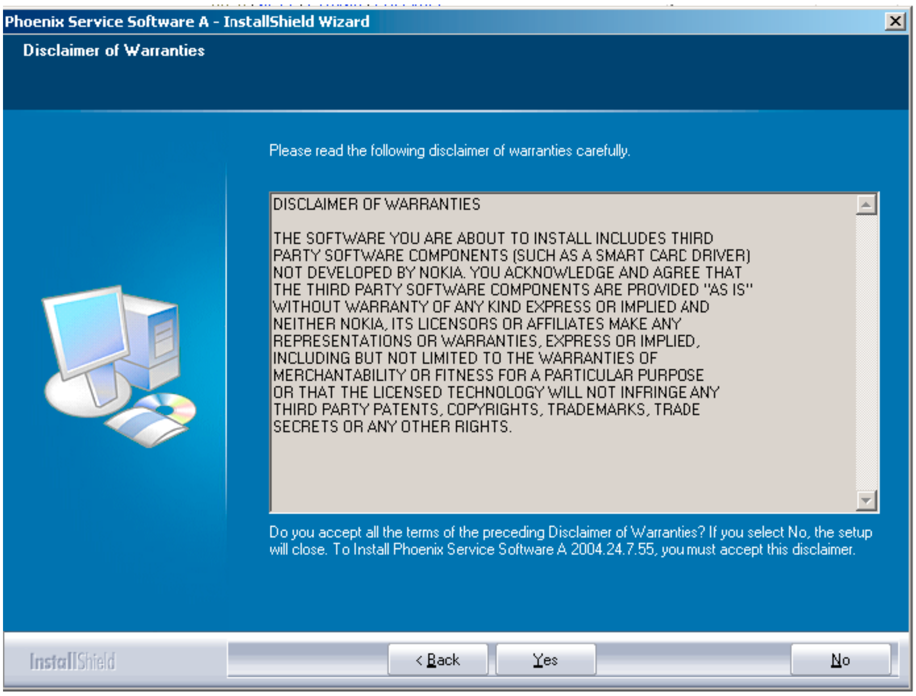

Phoenix Service Software Setup
InstallShield
< Back
Next >
Cancel

Welcome to the InstallShield Wizard for Phoenix Service Software A

This program will install Phoenx Service Software A10 2003.33.5.22 on your computer.

Figure 8 Welcome dialog

3. Read the disclaimer carefully.


Phoenix Service Software A - InstallShield Wizard
Disclaimer of Warranties
InstallShield
< Back
Yes
No

Please read the following disclaimer of warranties carefully.

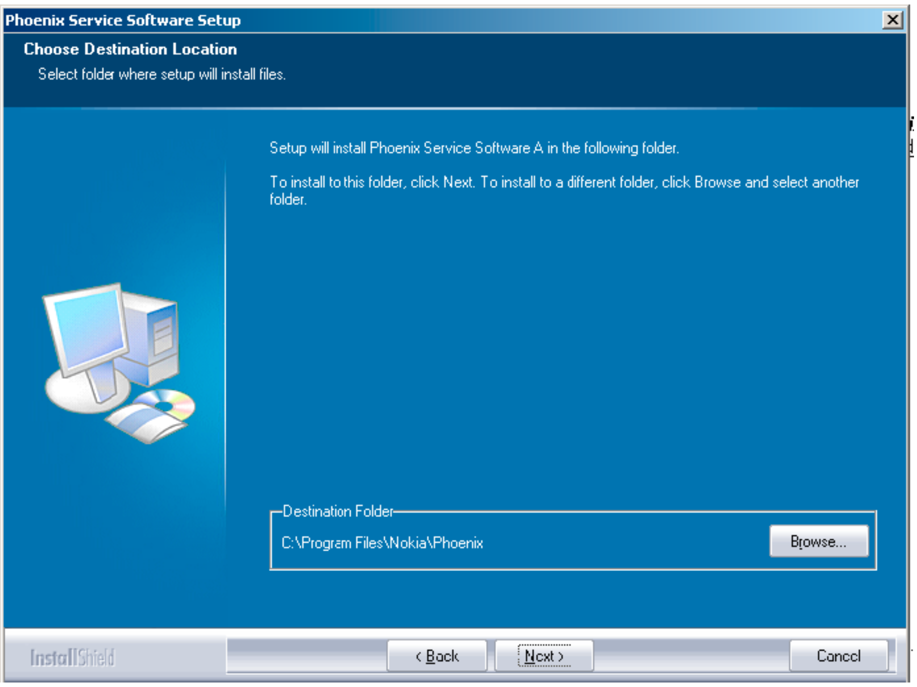
DISCLAIMER OF WARRANTIES

THE SOFTWARE YOU ARE ABOUT TO INSTALL INCLUDES THIRD PARTY SOFTWARE COMPONENTS (SUCH AS A SMART CARC DRIVER) NOT DEVELOPED BY NOKIA. YOU ACKNOWLEDGE AND AGREE THAT THE THIRD PARTY SOFTWARE COMPONENTS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND EXPRESS OR IMPLIED AND NEITHER NOKIA, ITS LICENSORS OR AFFILIATES MAKE ANY REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR THAT THE LICENSED TECHNOLOGY WILL NOT INFRINGE ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADEMARKS, TRADE SECRETS OR ANY OTHER RIGHTS.

Do you accept all the terms of the preceding Disclaimer of Warranties? If you select No, the setup will close. To Install Phoenix Service Software A 2004.24.7.55, you must accept this disclaimer.

Figure 9 Disclaimer text

4. Choose destination folder. The default folder *C:\ProgramFiles\Nokia\Phoenix* is recommended. Then click *Next* to continue. You may choose another location by selecting *Browse* (not recommended).


Phoenix Service Software Setup
Choose Destination Location
Select folder where setup will install files.
InstallShield
< Back
Next >
Cancel
Browse...

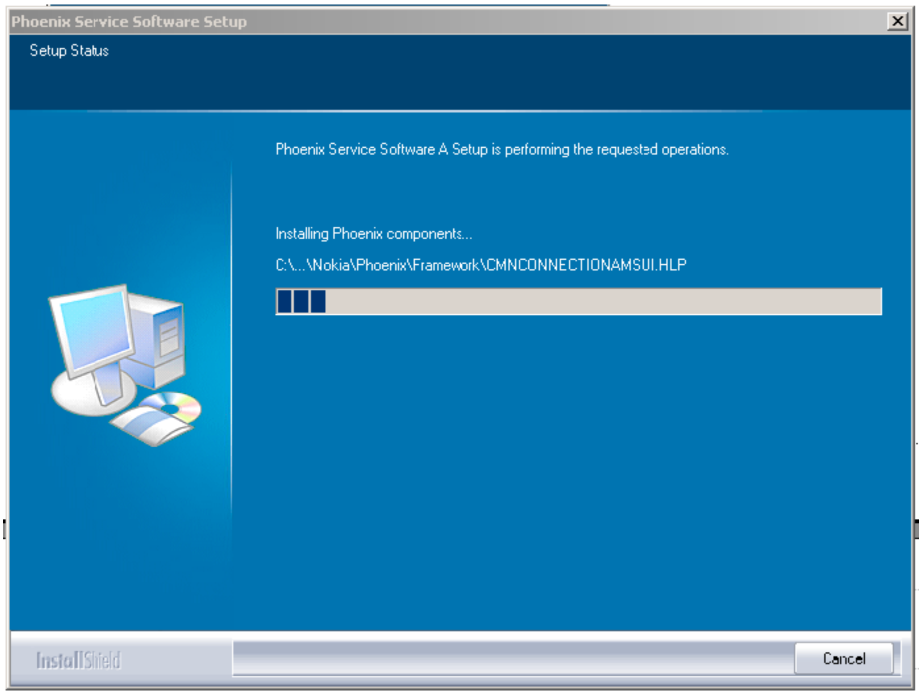
Setup will install Phoenix Service Software A in the following folder.

To install to this folder, click Next. To install to a different folder, click Browse and select another folder.

Destination Folder: C:\Program Files\Nokia\Phoenix

Figure 10 Destination folder

5. Wait for the components to be copied. The progress of the setup is shown in the *Setup Status* window.


Phoenix Service Software Setup
Setup Status
InstallShield
Cancel

Phoenix Service Software A Setup is performing the requested operations.

Installing Phoenix components...

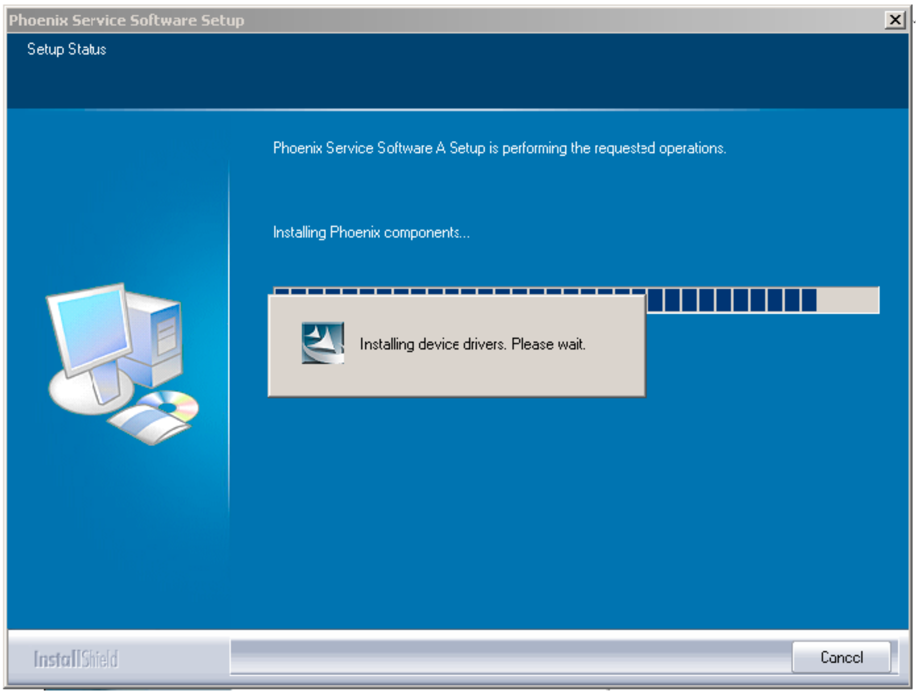
C:\...\Nokia\Phoenix\Framework\CMNCONNECTIONAMSUI.HLP

Figure 11 Installation status 1

6. Wait for the drivers to be installed and updated.

   The process may take several minutes to complete.

   If the operating system does not require rebooting (Windows 2000, XP) the PC components are registered right away.

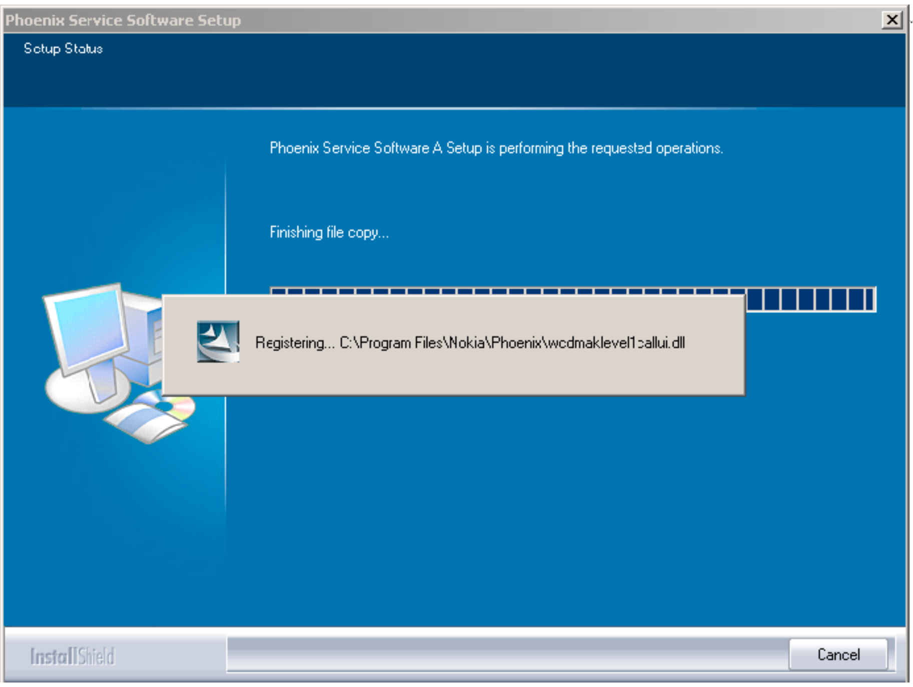

Phoenix Service Software Setup
Setup Status
InstallShield
Cancel

Phoenix Service Software A Setup is performing the requested operations.

Installing Phoenix components...

Installing device drivers. Please wait.

Figure 12 Installation status 2


Phoenix Service Software Setup
Setup Status
InstallShield
Cancel

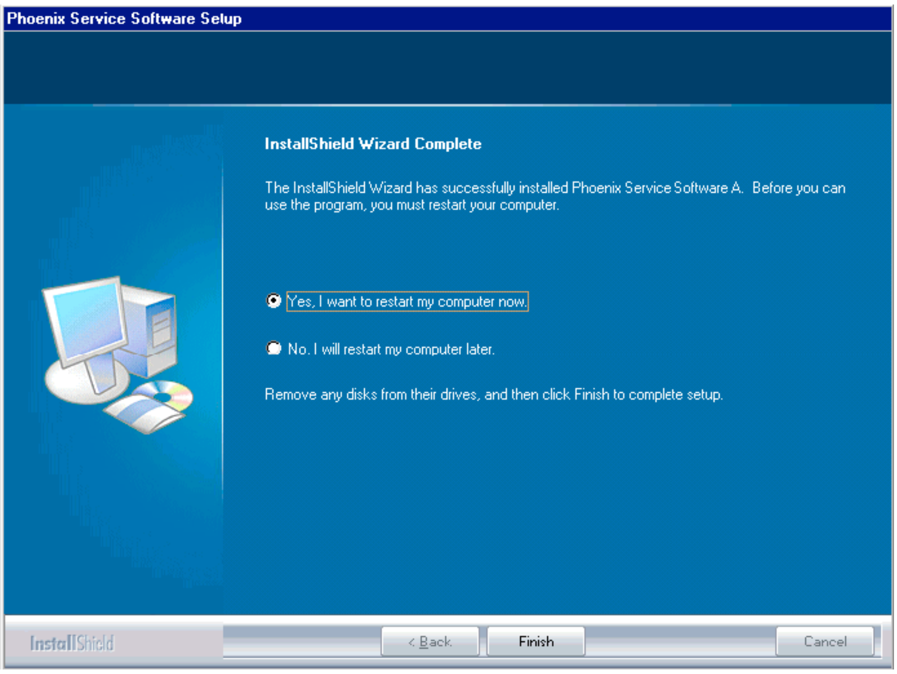
Phoenix Service Software A Setup is performing the requested operations.

Finishing file copy...

Registering... C:\Program Files\Nokia\Phoenix\wcdmaklevel1callui.dll

Figure 13 Registering components 1

If the operating system requires restarting your computer (Windows 98, SE, ME) the Install Shield Wizard will tell you about it. Select *Yes...* to reboot the PC immediately and *No...* to reboot the PC manually afterwards.



InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Phoenix Service Software A. Before you can use the program, you must restart your computer.

● Yes, I want to restart my computer now.

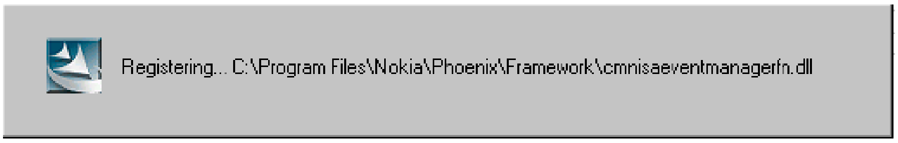
○ No, I will restart my computer later.

Remove any disks from their drives, and then click Finish to complete setup.

Figure 14 Restart computer

After the reboot, components are registered and Phoenix is ready for use.

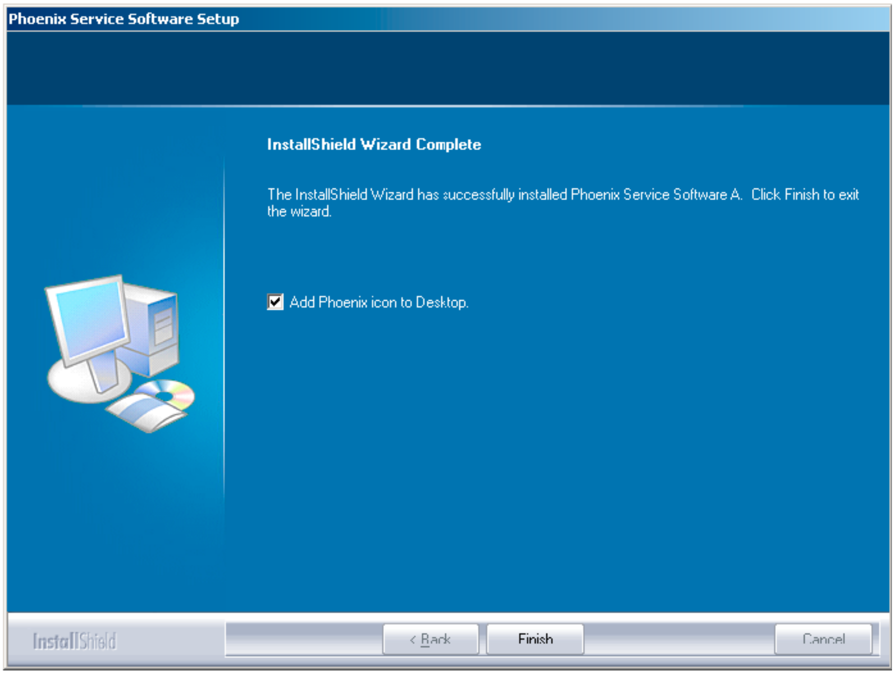
Note: Phoenix does not work, if components have not been registered.



Registering... C:\Program Files\Nokia\Phoenix\Framework\cmnisaeventmanagerfn.dll

Figure 15 Registering components 2

7. Click *Finish* to end installation.



Phoenix Service Software Setup

InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Phoenix Service Software A. Click Finish to exit the wizard.

☑ Add Phoenix icon to Desktop.

Figure 16 Finish installation

Phoenix is now ready for use.

Next action

Before using Phoenix Service Software, you must:

- install phone model specific data package for Phoenix, and
- configure users and connections.

FPS-8* can be used after updating its Flash Update Package files.

Phoenix update installation

If you already have the Phoenix Service SW installed on your computer, sooner or later there will be need to update it when new versions are released.

Always use the latest available versions of both the Phoenix Service SW and the phone-specific Data Package. Instructions can be found in phone model specific Technical Bulletins and Phone Data Package readme.txt files (shown during installation).

To update the Phoenix Service Software you need to take exactly the same steps as when installing it for the first time:

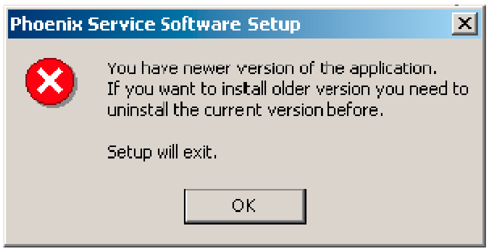
- Download the installation package to your computer hard disk.
- Close all other programs.
- Run the application file (for example, phoenix_service_sw_a15_2004_24_7_55.exe).
- New version of Phoenix will be installed.
- Driver versions will be checked and updated.

When you update Phoenix from old to new version (for example, a14_2004_16_4_47 to a15_2004_24_7_55), the update will take place automatically without uninstallation.

If you try to update the Phoenix Service Software with the same version that you already have (for example, a15_2004_24_7_55 to a15_2004_24_7_55) you are asked if you want to uninstall the version of Phoenix you have on your PC. In this case you can choose between total uninstallation and repair just like when you choose to uninstall Phoenix service software from the Windows Control panel.

If you try to install an older version (for example, downgrade from a15_2004_24_7_55 to a14_2004_16_4_47), installation will be interrupted.

Always follow the instructions on the screen.



Phoenix Service Software Setup

You have newer version of the application.
If you want to install older version you need to uninstall the current version before.

Setup will exit.

Figure 17 Installation interrupted

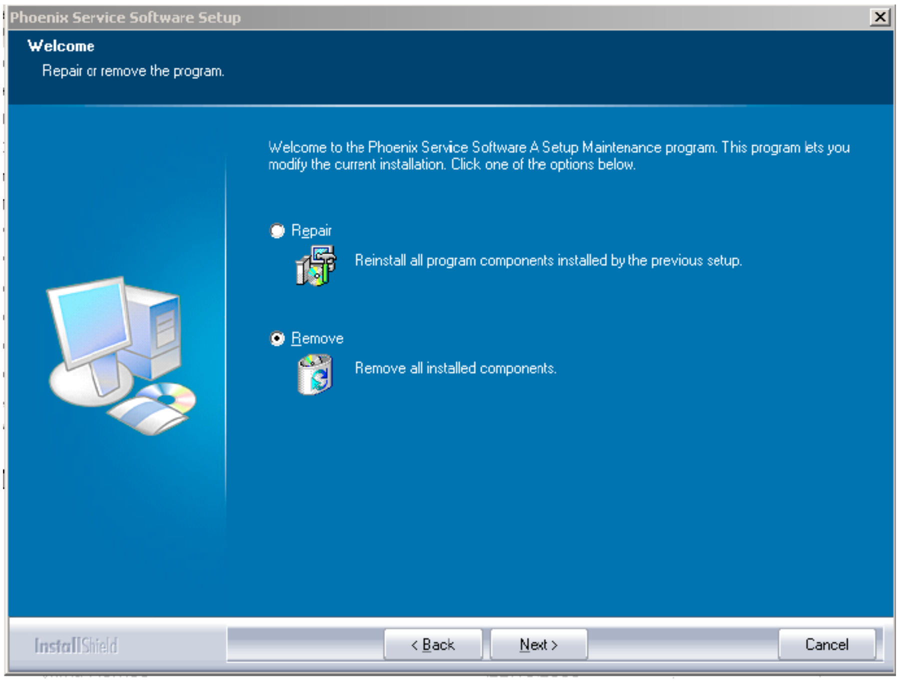
Uninstalling Phoenix

Context

Uninstallation can be done manually from *Windows Control Panel -> Add/Remove Programs*.

Steps

1. Choose *Phoenix Service Software -> Add/Remove -> Remove* to uninstall Phoenix.



Phoenix Service Software Setup

Welcome

Repair or remove the program.

Welcome to the Phoenix Service Software A Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.

○ Repair

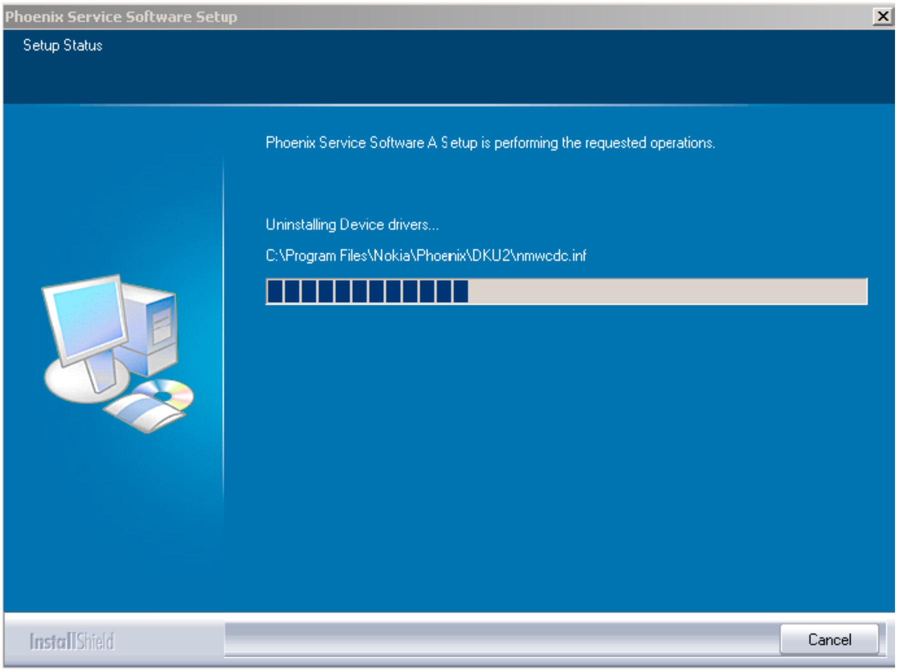
Reinstall all program components installed by the previous setup.

● Remove

Remove all installed components.

Figure 18 Remove program

The progress of the uninstallation is shown.


Phoenix Service Software Setup
Setup Status
InstallShield
Cancel

Phoenix Service Software A Setup is performing the requested operations.

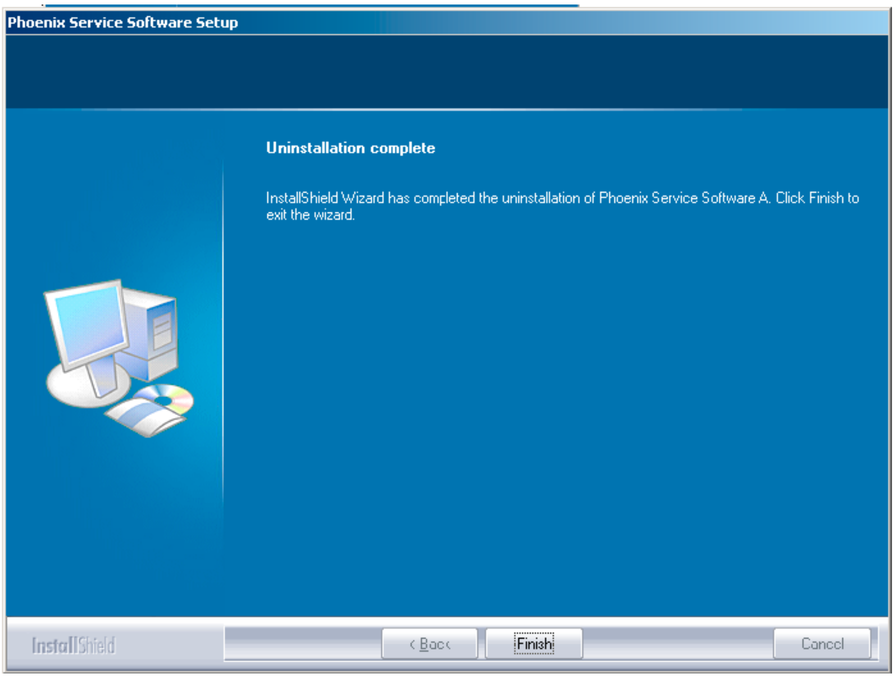
Uninstalling Device drivers...

C:\Program Files\Nokia\Phoenix\DKU2\nmwcdc.inf

Figure 19 Uninstallation status

2. If the operating system does not require rebooting, click *Finish* to complete.

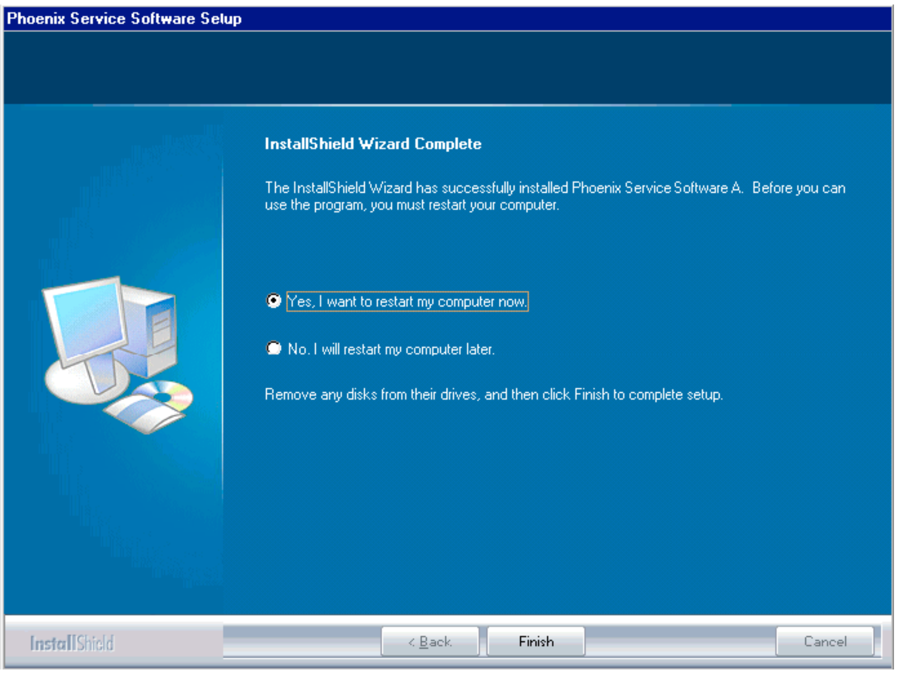
   Else, Install Shield Wizard will tell you about it. Select *Yes...* to reboot the PC immediately and *No...* to reboot the PC manually afterwards.


Phoenix Service Software Setup
InstallShield
< Back
Finish
Cancel

Uninstallation complete

InstallShield Wizard has completed the uninstallation of Phoenix Service Software A. Click Finish to exit the wizard.

Figure 20 Finish uninstallation



InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Phoenix Service Software A. Before you can use the program, you must restart your computer.

● Yes, I want to restart my computer now.

○ No, I will restart my computer later.

Remove any disks from their drives, and then click Finish to complete setup.

Figure 21 Restart computer

Repairing Phoenix installation

Context

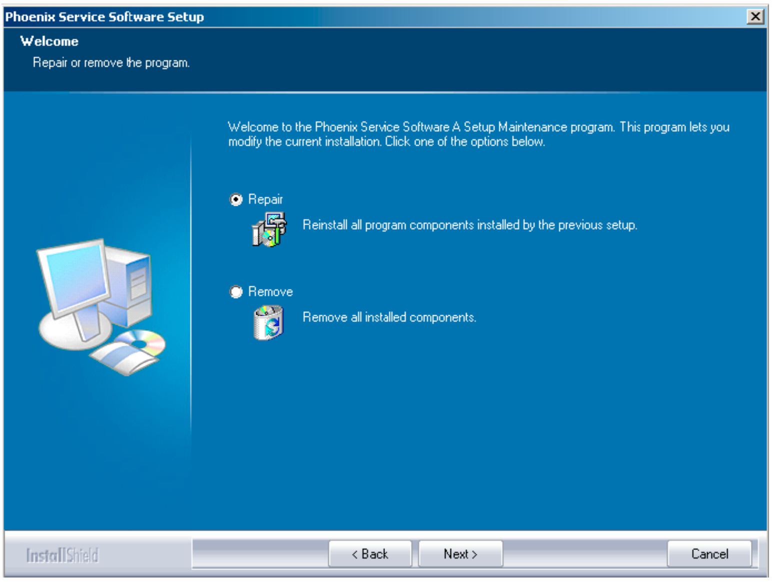
If you experience any problems with the service software, or suspect that files have been lost, you can use the repair function before completely reinstalling Phoenix.

> **Note:** The original installation package (for example, *phoenix_service_sw_a15_2004_24_7_55.exe*) must be found on your PC when you run the repair setup.

Steps

1. Open *Windows Control Panel -> Add/Remove Programs*.
2. Select *Phoenix Service Software -> Add/Remove*.
3. In the following view, choose *Repair*.

   Phoenix will now reinstall components and register them. The procedure is the same as in the update installation.



Phoenix Service Software Setup
Welcome
Repair or remove the program.

Welcome to the Phoenix Service Software A Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.

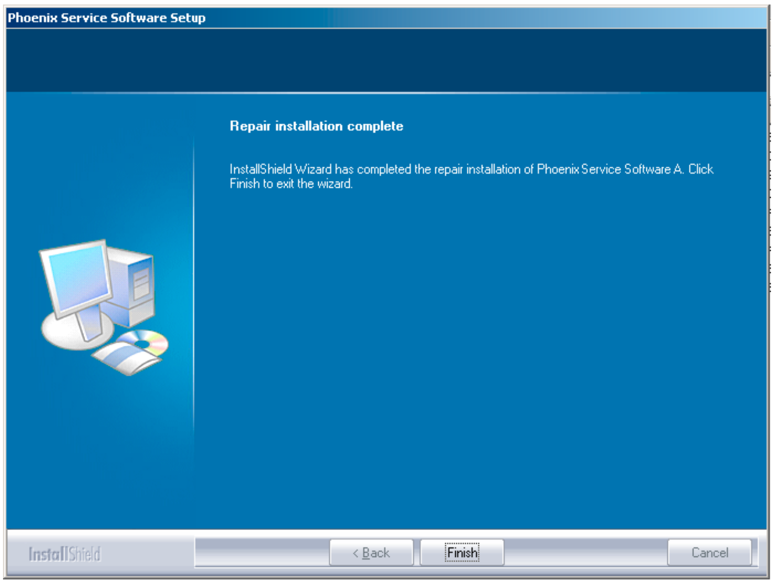
● Repair
Reinstall all program components installed by the previous setup.

○ Remove
Remove all installed components.

InstallShield
< Back
Next >
Cancel

Figure 22 Repair program

4. Click *Finish* to complete repair.



Phoenix Service Software Setup

Repair installation complete

InstallShield Wizard has completed the repair installation of Phoenix Service Software A. Click Finish to exit the wizard.

InstallShield
< Back
Finish
Cancel

Figure 23 Finish repair installation

Phoenix service software data package overview

Each product has its own data package (DP). This contains all product-specific data files to make the Phoenix Service Software and tools usable with a certain phone model:

- Product software binary files
- Files for type label printing
- Validation file for the faultlog repair data reporting system
- All product-specific configuration files for Phoenix Service Software components

Data files are stored under C:\Program Files\Nokia\Phoenix (default).

Installing Phoenix data package

Before you begin

1 Verify that The data package contains all product-specific data to make the Phoenix Service Software and tools usable with a certain phone model.

2 Check that the dongle is attached to the parallel port of your computer.

3 Install Phoenix Service SW.

4 Download the installation package (for example, *RM-51_dp_EA_v_1_0.exe*) to your computer (for example, in *C:\TEMP*).

5 Close all other programs.

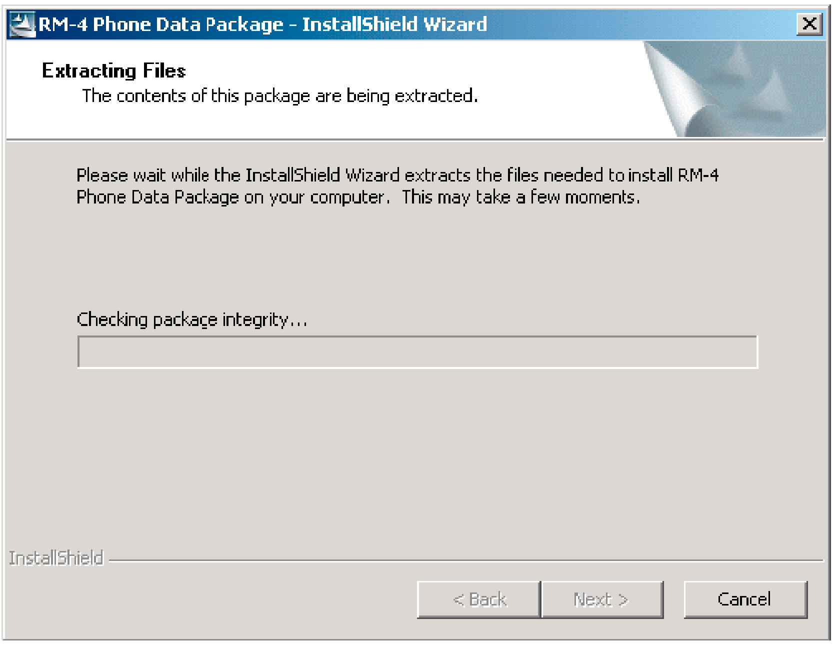
6 Run the application file (for example, *RM-51_dp_EA_ v_1_0.exe*) and follow the instructions on the screen.

If you already have the Phoenix Service SW installed on your computer, you will need to update it when a new version is released.

> **Note:** Very often the Phoenix Service SW and the phone-specific data package for Phoenix come in pairs, meaning that a certain version of Phoenix can only be used with a certain version of the data package. Always use the latest available versions of both. Instructions can be found in phone model specific Technical Bulletins and *readme.txt* files of the data packages.

Steps

1. To start installation, run the application file (for example, *RM-51_dp_EA_ v_1_0.exe*).
2. Click *Next*, and wait for the installation files to be extracted.



RM-4 Phone Data Package - InstallShield Wizard

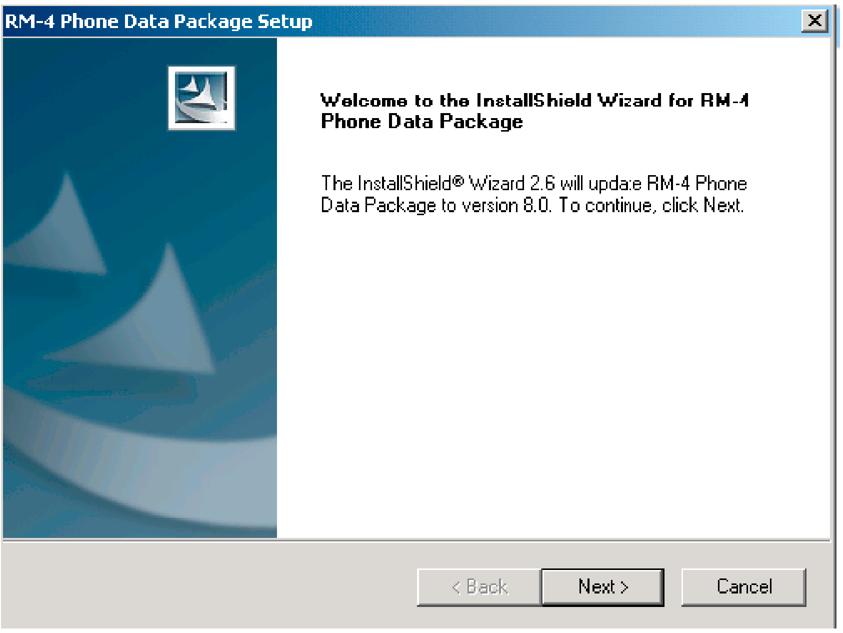
Extracting Files
The contents of this package are being extracted.

Please wait while the InstallShield Wizard extracts the files needed to install RM-4 Phone Data Package on your computer. This may take a few moments.

Checking package integrity...

Figure 24 Extracting files

3. Click *Next* to continue.



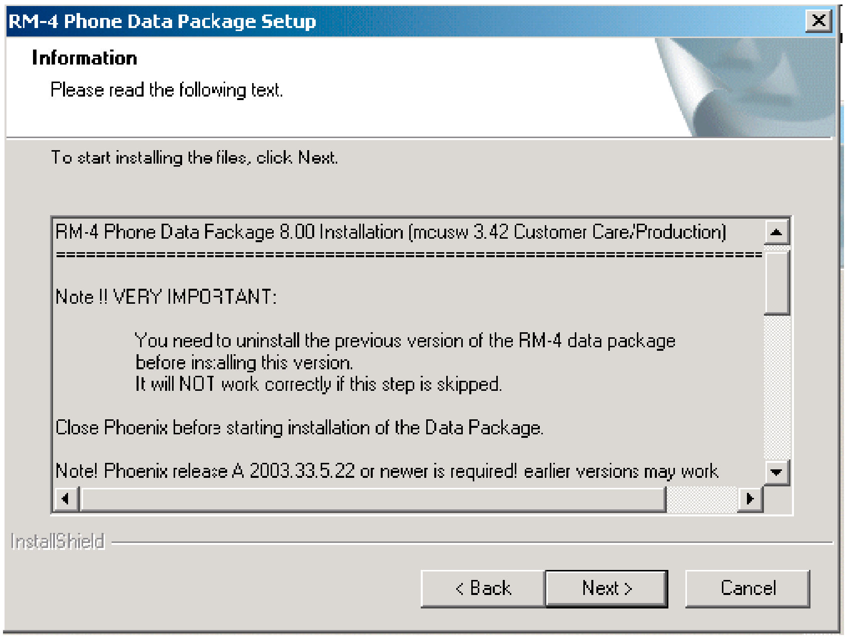
Welcome to the InstallShield Wizard for RM-4 Phone Data Package

The InstallShield® Wizard 2.6 will update RM-4 Phone Data Package to version 8.0. To continue, click Next.

Figure 25 Continue data package installation

In this view you can see the contents of the data package. Read the text carefully. There should be information about the Phoenix version required with this data package.

Click *Next* to continue.



Information

Please read the following text.

To start installing the files, click Next.

RM-4 Phone Data Package 8.00 Installation (mcusw 3.42 Customer Care/Production)
==

Note !! VERY IMPORTANT:

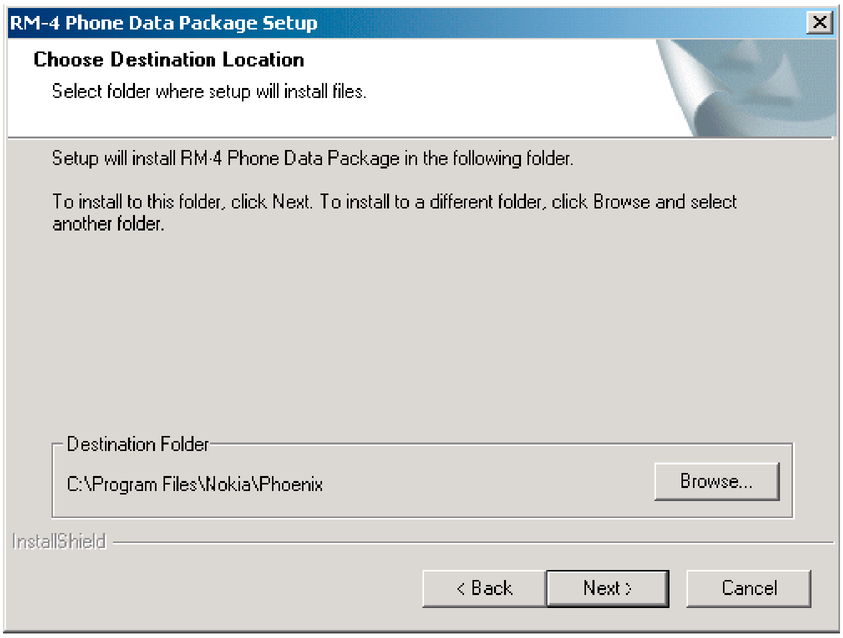
You need to uninstall the previous version of the RM-4 data package
before installing this version.
It will NOT work correctly if this step is skipped.

Close Phoenix before starting installation of the Data Package.

Note! Phoenix release A 2003.33.5.22 or newer is required! earlier versions may work

Figure 26 Data package setup information

4. Confirm location and click *Next* to continue.



RM-4 Phone Data Package Setup
InstallShield
< Back
Next >
Cancel
Browse...

Choose Destination Location

Select folder where setup will install files.

Setup will install RM-4 Phone Data Package in the following folder.

To install to this folder, click Next. To install to a different folder, click Browse and select another folder.

Destination Folder

C:\Program Files\Nokia\Phoenix

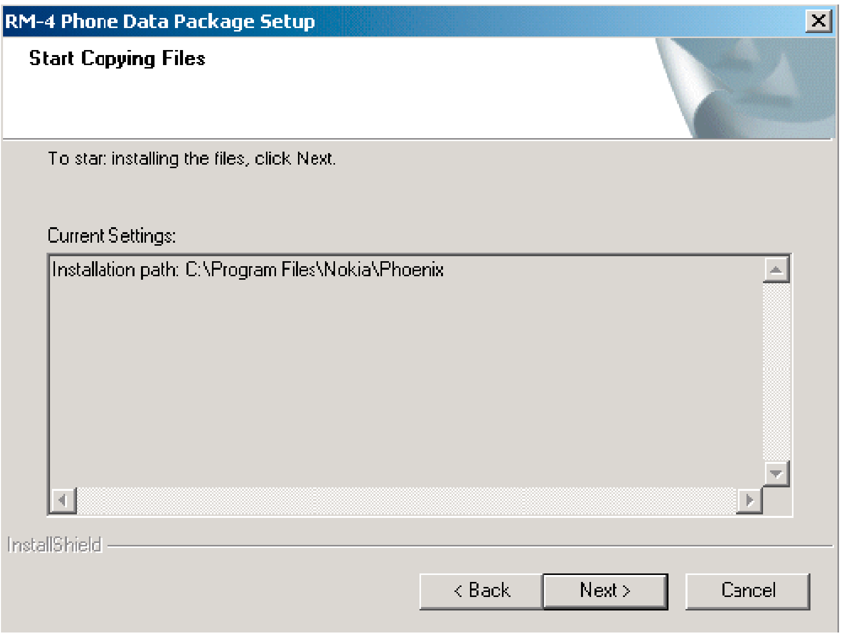
Figure 27 Data package destination folder

The install shield checks where the Phoenix application is installed and the directory is shown.

Click *Next* to continue.

5. Click *Next* to start copying the files.

Phone model specific files will be installed. Please wait.



RM-4 Phone Data Package Setup
InstallShield
< Back
Next >
Cancel

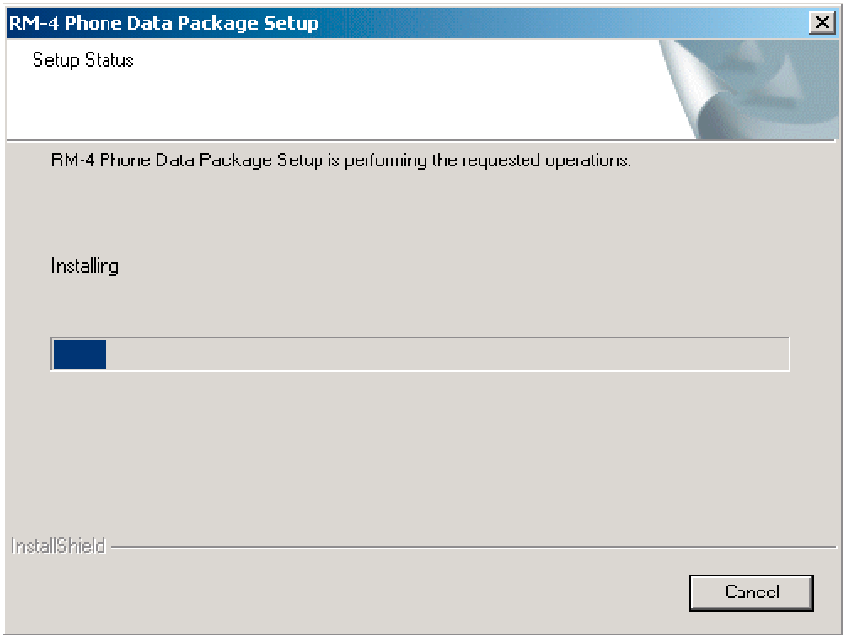
Start Copying Files

To start installing the files, click Next.

Current Settings:

Installation path: C:\Program Files\Nokia\Phoenix

Figure 28 Start copying files



RM-4 Phone Data Package Setup

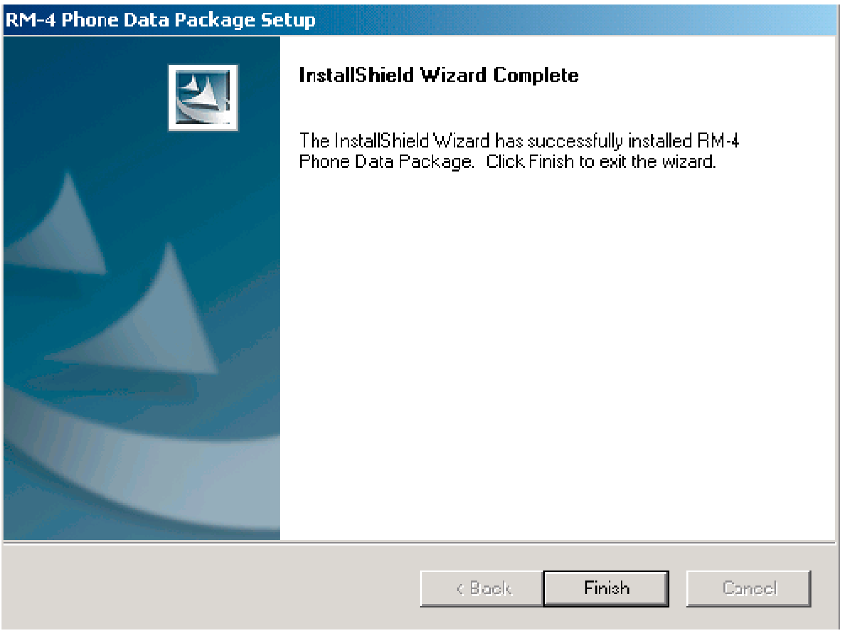
Setup Status

RM-4 Phone Data Package Setup is performing the requested operations.

Installing

Figure 29 Data package installation status

6. Click *Finish* to complete the installation.



RM-4 Phone Data Package Setup

InstallShield Wizard Complete

The InstallShield Wizard has successfully installed RM-4 Phone Data Package. Click Finish to exit the wizard.

Figure 30 Finish data package installation

You now have all phone model specific files installed in your Phoenix Service SW.

Next action

Phoenix can be used, for example, for flashing phones and printing type labels. But first you must:

- configure users, and
- manage connections.

FLS-4S can be used right away.

FPS-8* can be used after updating Flash Update Package files.

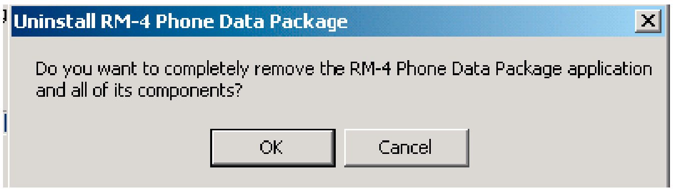
Uninstalling Phoenix data package

Context

If you try to install the same version of Phoenix data package that you already have, you are asked if you want to uninstall the version you have on your PC. Older versions of data packages don´t need to be uninstalled unless instructions to do so are given in the *readme.txt* file of the data package and bulletins concerning the release. Please read all related documents carefully.

Steps

1. Click *OK* to uninstall, *Cancel* if you don't want to uninstall.

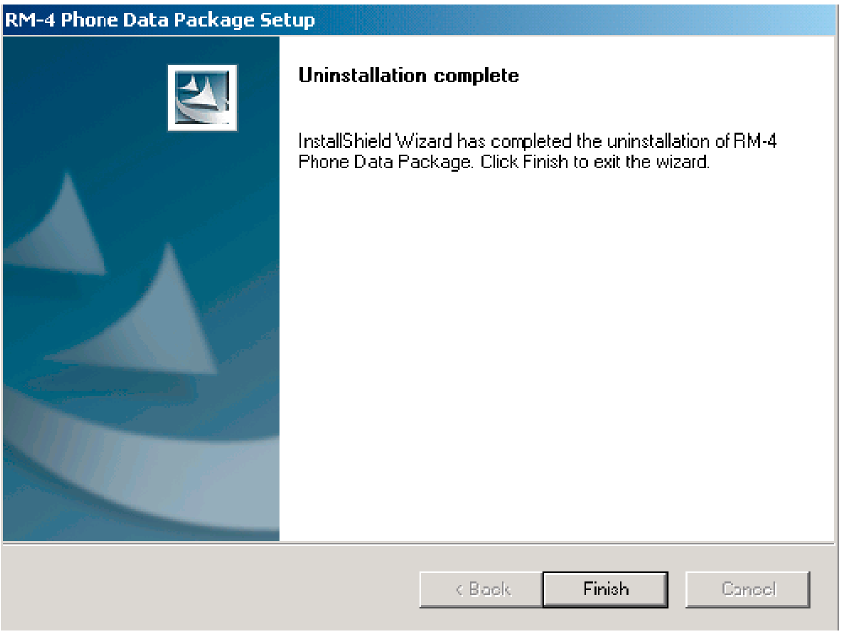


Uninstall RM-4 Phone Data Package

Do you want to completely remove the RM-4 Phone Data Package application and all of its components?

Figure 31 Uninstalling Phoenix data package

2. Once the previously installed data package is uninstalled, click *Finish*.



RM-4 Phone Data Package Setup

Uninstallation complete

InstallShield Wizard has completed the uninstallation of RM-4 Phone Data Package. Click Finish to exit the wizard.

Figure 32 Finish data package uninstallation

Alternative steps

- Uninstallation can also be done manually from *Windows Control Panel -> Add/Remove Programs -> xx-xx (* Phone Data Package)*. (*= type designator of the phone

Next action

Run the installation package again to continue installation from the beginning.

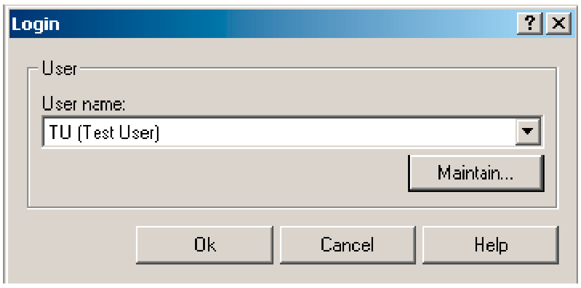
Service software instructions

Configuring users in Phoenix

Steps

1. Start Phoenix Service SW and log in.

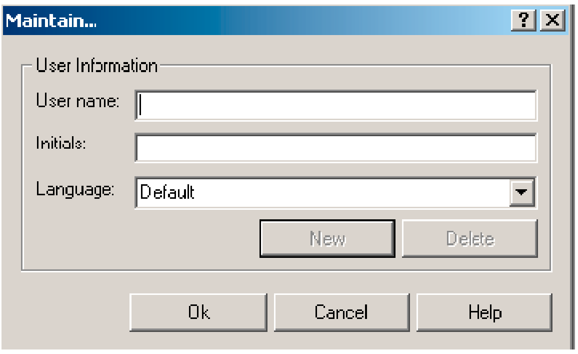
   If your user ID is already configured, choose it from the dropdown list and click *OK*. To add a new user or edit existing ones click *Maintain*.


Login
User
Maintain...
Ok
Cancel
Help

User name: TU (Test User)

Figure 33 Login

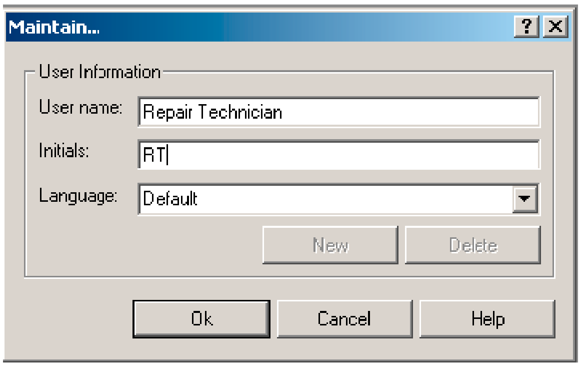
2. Choose *New* to add information for a new user.


Maintain...
User Information
User name:
Initials:
New
Delete
Ok
Cancel
Help

Language: Default

Figure 34 Add information for new user 1

3. Type in your name and initials and click *OK*.


Maintain...
User Information
New
Delete
Ok
Cancel
Help

User name: Repair Technician
Initials: RT
Language: Default

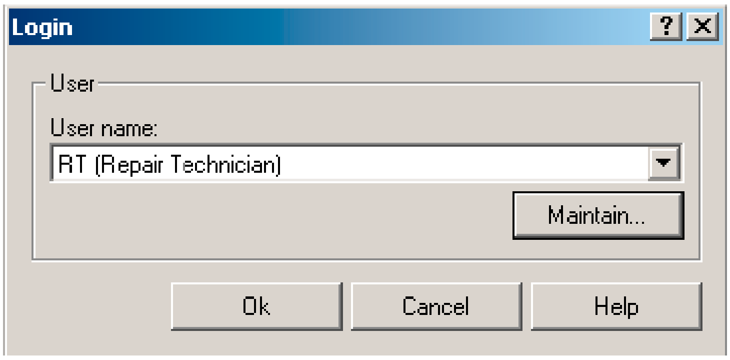
Figure 35 Add information for new user 2

   A new user is now created.

4. Click *OK*.

   You are now able to login with this user name.

5. Click *OK*.



Login
User
User name:
RT (Repair Technician)
Maintain...
Ok
Cancel
Help

Figure 36 Login, user configured

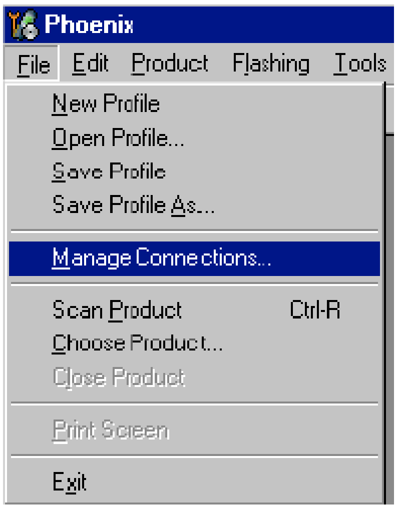
Managing connections in Phoenix

Steps

1. Start *Phoenix Service SW* and log in.

Figure 37 Phoenix icon

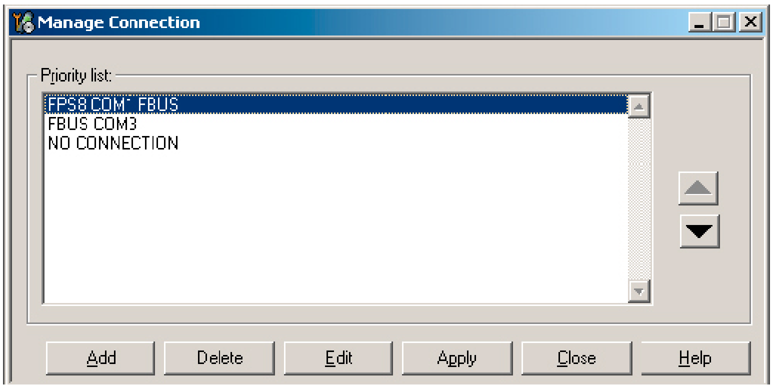
2. Choose *File -> Manage Connections*.



Phoenix
File
Edit
Product
Flashing
Tools
New Profile
Open Profile...
Save Profile
Save Profile As...
Manage Connections...
Scan Product
Ctrl-R
Choose Product...
Close Product
Print Screen
Exit

Figure 38 Manage connections

Existing connections can be selected, edited, deleted, and new ones created by using this dialog.



Manage Connection
Add
Delete
Edit
Apply
Close
Help

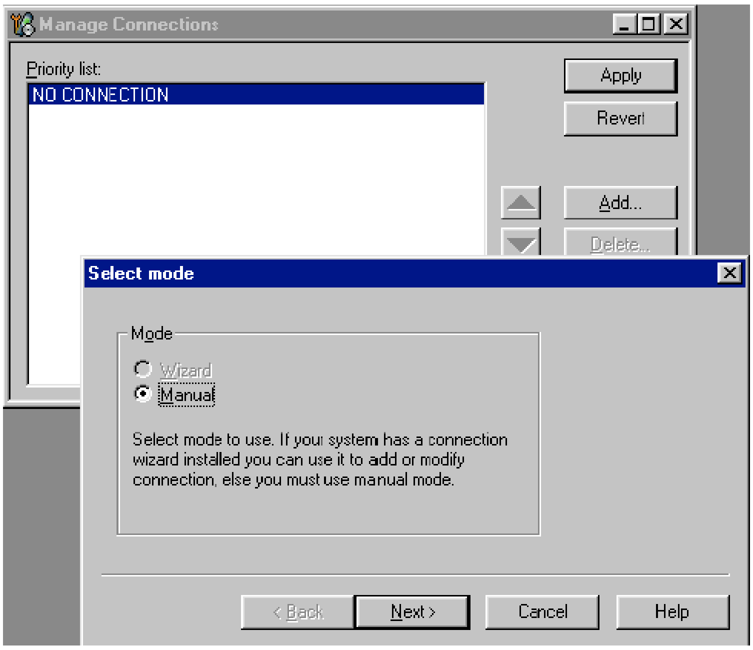
Priority list:
- FPS8 COM1 FBUS
- FBUS COM3
- NO CONNECTION

Figure 39 Connections list

3. Click *Add* to add a new connection, and select if you want to create it manually or by using the Connection Wizard.

   In the following dialogs you will be asked to select settings for the connection. If you use the Wizard, connect the tools and a phone to your PC and the wizard will automatically try to configure the correct connection.

4. Select *Manual* mode, and click *Next* to continue.



Manage Connections
Apply
Revert
Add...
Delete...
Select mode
< Back
Next >
Cancel
Help

Priority list:
- NO CONNECTION

Mode
- ○ Wizard
- ● Manual

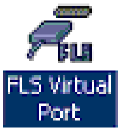
Select mode to use. If your system has a connection wizard installed you can use it to add or modify connection, else you must use manual mode.

Figure 40 Select mode: Manual

i For FLS-4S POS Flash Device, choose the following connection settings:

- Media: FBUS
- COM Port: Virtual COM Port used by FLS-4

  Note: ALWAYS check this. Go to *Windows -> Control Panel -> FLS Virtual Port -> Configuration*.



FLS
FLS Virtual Port

Figure 41 FLS virtual port icon

ii For FPS-8 Flash Prommer, choose the following connection settings:

- Media: FPS-8
- Port Num: COM Port where FPS-8 is connected
- COMBOX_DEF_MEDIA: FBUS

5. Click *Finish* to complete the configuration.
6. Activate the connection you want to use by clicking it, use up/down arrows to move it on top of the list, and click *Apply*.

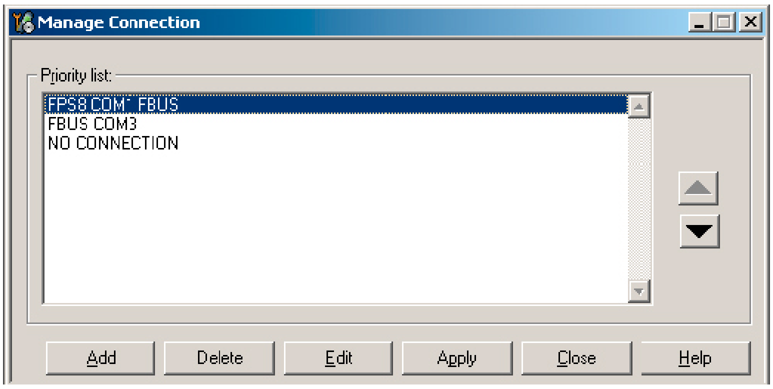

Manage Connection
Priority list:
FPS8 COM* FBUS
FBUS COM3
NO CONNECTION
Add
Delete
Edit
Apply
Close
Help

Figure 42 Connections list

The connection is now selected and can be used after closing the *Manage Connections* window.

Selected connection will be shown on the right hand bottom corner of the screen.

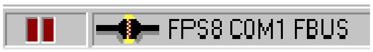

FPS8 COM1 FBUS

Figure 43 Connection information

7. To use the selected connection, connect the phone to Phoenix with correct service tools, make sure that it is switched on and select *Scan Product*.

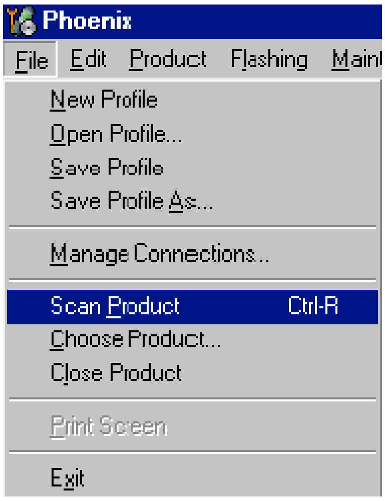
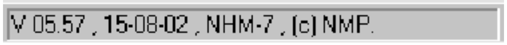

Phoenix
File
Edit
Product
Flashing
Maint
New Profile
Open Profile...
Save Profile
Save Profile As...
Manage Connections...
Scan Product Ctrl-R
Choose Product...
Close Product
Print Screen
Exit

Figure 44 Scan product

When a product is found, Phoenix will load product support. Name of the loaded product support module and its version information will be shown on the bottom of the screen.



V 05.57 , 15-08-02 , NHM-7 , (c) NMP.

Figure 45 Product support module information

Installing Flash support files for FPS-8* and FLS-4*

Before you begin

Note: This is a separate installation package.

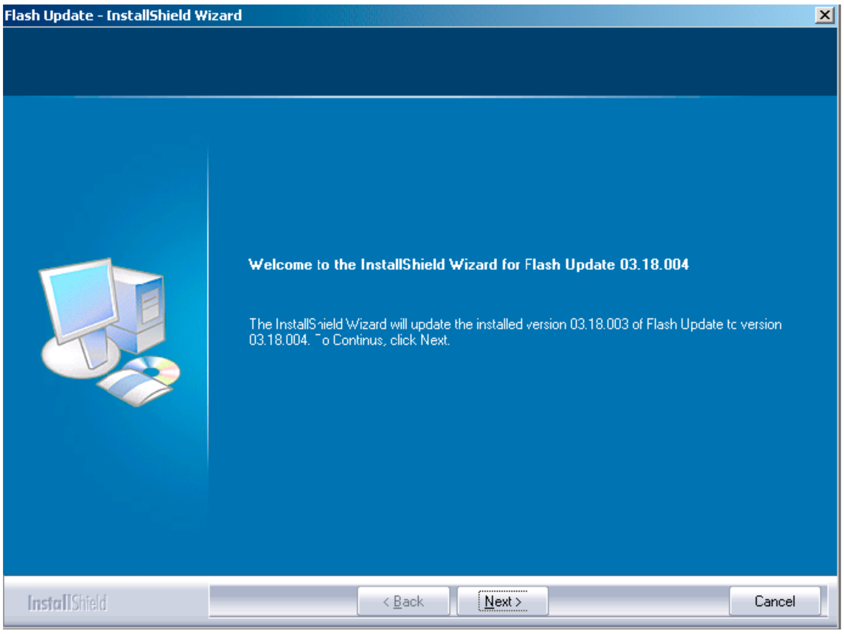
- Install Phoenix Service SW.
- Install phone model specific data package for Phoenix.
- The flash support files are delivered in the same installation package with Phoenix data packages or newer Phoenix packages since September 2003.
- Normally it is enough to install Phoenix and the phone-specific data package because the Phoenix installation always includes the latest flash update package files for FLS-4S/FPS-8*.
- A separate installation package for flash support files is available, and the files can be updated according to this instruction if updates appear between Phoenix/data package releases.

Context

If you are not using a separate installation package, you can skip this section and continue with FPS-8 Flash prommer SW update (Page 3–28) after installing a new phone data package.

Steps

1. Start by double clicking *flash_update_03_13_001.exe* to begin installation.

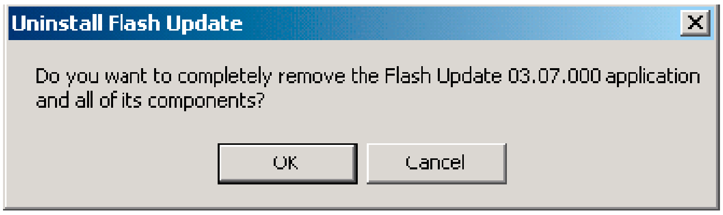


Welcome to the InstallShield Wizard for Flash Update 03.18.004

The InstallShield Wizard will update the installed version 03.18.003 of Flash Update to version 03.18.004. To Continue, click Next.

Figure 46 Flash update welcome dialog

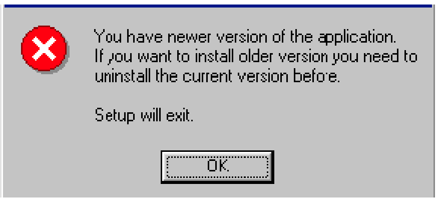
2. If the same version of Flash Update package already exists, and you want to reinstall it, the previous package is first uninstalled. Run the installation again.



Do you want to completely remove the Flash Update 03.07.000 application and all of its components?

Figure 47 Uninstall flash update package

If you try to downgrade the existing version to older ones, the setup will be aborted. If you really want to downgrade, uninstall newer files manually from *Control Panel* and then rerun the installation again.

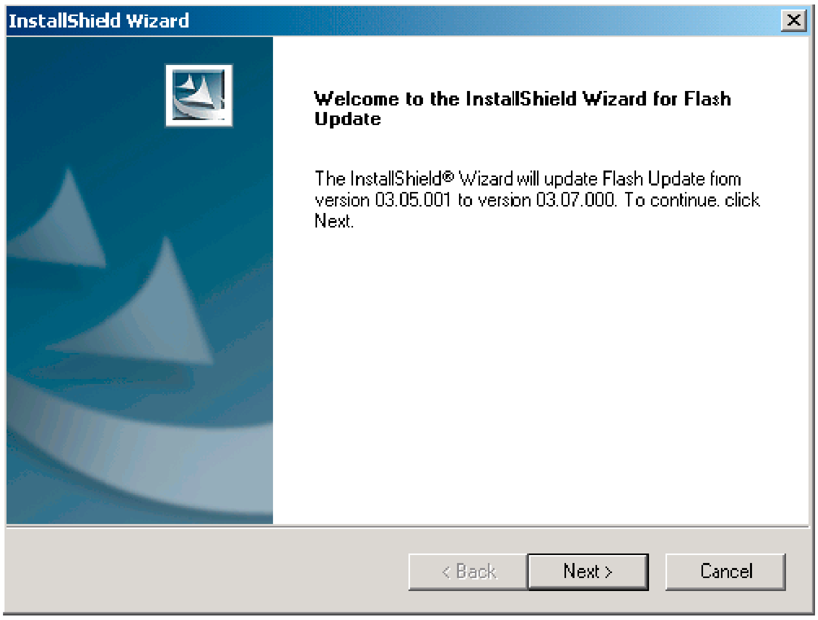


You have newer version of the application.
If you want to install older version you need to uninstall the current version before.

Setup will exit.

Figure 48 Flash installation interrupted

If an older version exists on your PC and it needs to be updated, click *Next* to continue installation.

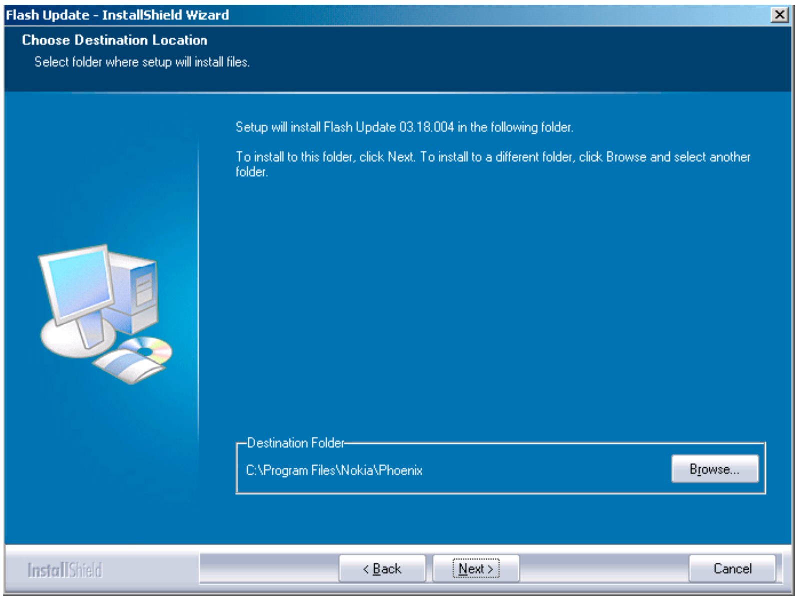


Welcome to the InstallShield Wizard for Flash Update

The InstallShield® Wizard will update Flash Update from version 03.05.001 to version 03.07.000. To continue, click Next.

Figure 49 Continue flash update

3. It is highly recommended to install the files to the default destination folder *C:\Program Files\Nokia\Phoenix*. Click *Next* to continue.


Flash Update - InstallShield Wizard
Choose Destination Location
Select folder where setup will install files.
Destination Folder
Browse...
InstallShield
< Back
Next >
Cancel

Setup will install Flash Update 03.18.004 in the following folder.

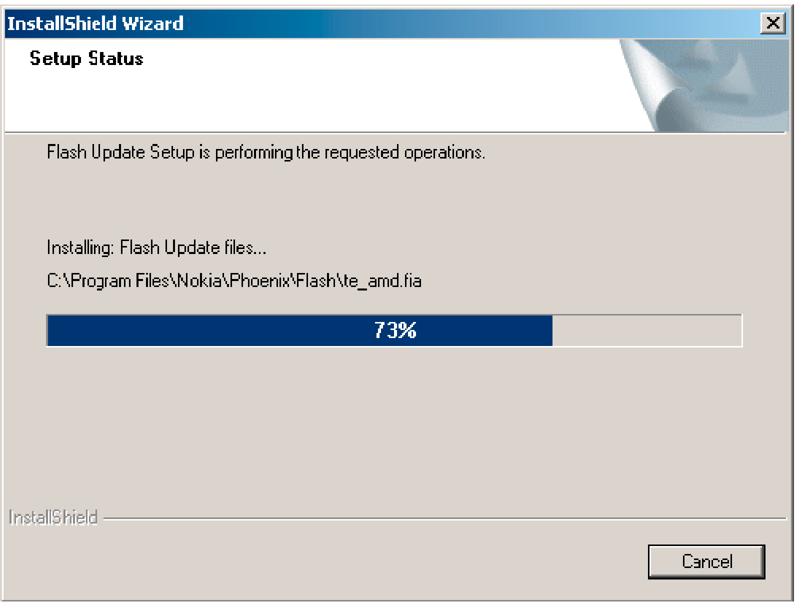
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.

C:\Program Files\Nokia\Phoenix

Figure 50 Flash destination folder

When installing the flash update files for the first time you may choose another location by selecting *Browse*. However, this is not recommended.

Installation will continue.


InstallShield Wizard
Setup Status
73%
InstallShield
Cancel

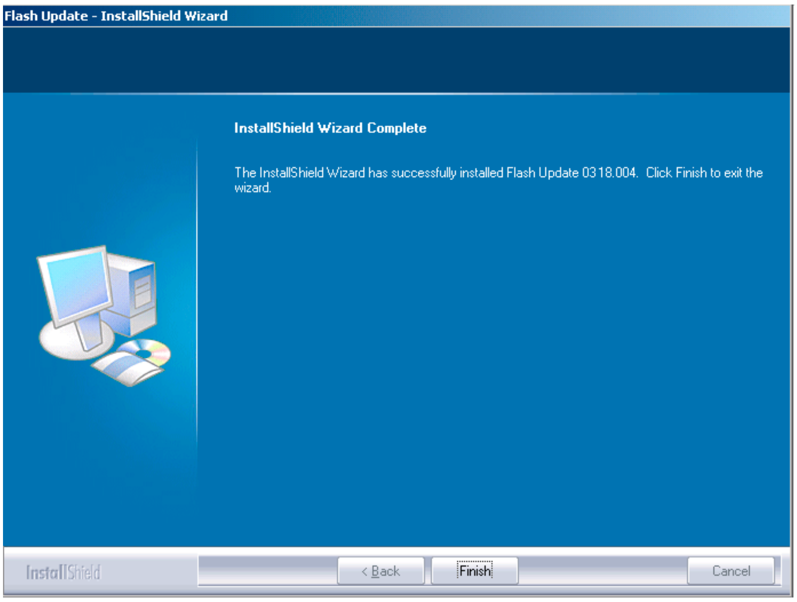
Flash Update Setup is performing the requested operations.

Installing: Flash Update files...

C:\Program Files\Nokia\Phoenix\Flash\te_amd.fia

Figure 51 Flash installation status

4. Choose *Finish* to complete the installation procedure.


Flash Update - InstallShield Wizard
InstallShield
< Back
Finish
Cancel

InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Flash Update 0318.004. Click Finish to exit the wizard.

Figure 52 Finish flash update

Next action

FLS-4 can be used right after the Flash Update Package is installed.

FPS-8* flash prommer must be updated using Phoenix!

Updating FPS-8 Flash prommer software

Steps

1. Start *Phoenix Service Software* and log in, manage connection correctly for the FPS-8* flash prommer.

Figure 53 Phoenix icon

2. Choose *Flashing -> FPS-8 maintenance*.

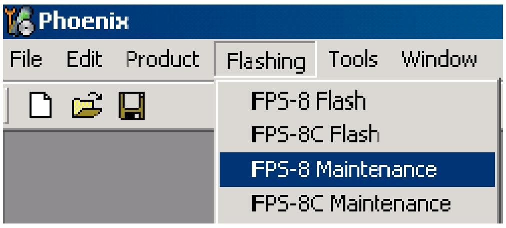
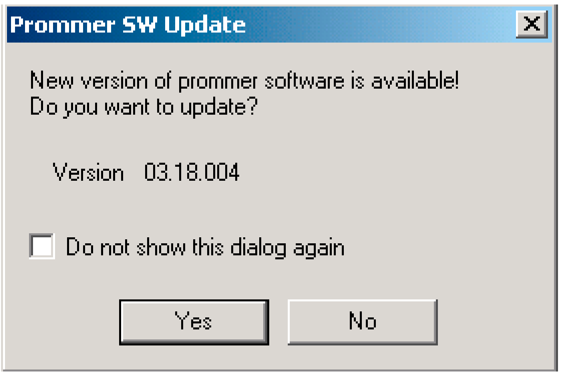

Phoenix
File
Edit
Product
Flashing
Tools
Window
FPS-8 Flash
FPS-8C Flash
FPS-8 Maintenance
FPS-8C Maintenance

Figure 54 FPS-8 maintenance

3. When the new FPS-8 flash update package is installed to computer you will be asked to update the files to your FPS-8 Prommer. Select *Yes* to update files.



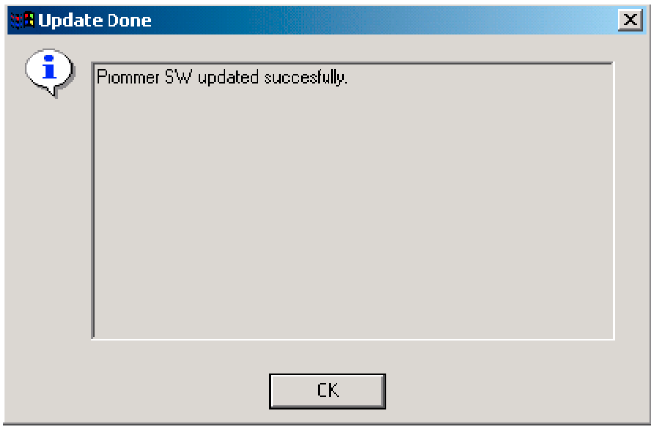
New version of prommer software is available!
Do you want to update?

Version 03.18.004

☐ Do not show this dialog again

Figure 55 Prommer SW update

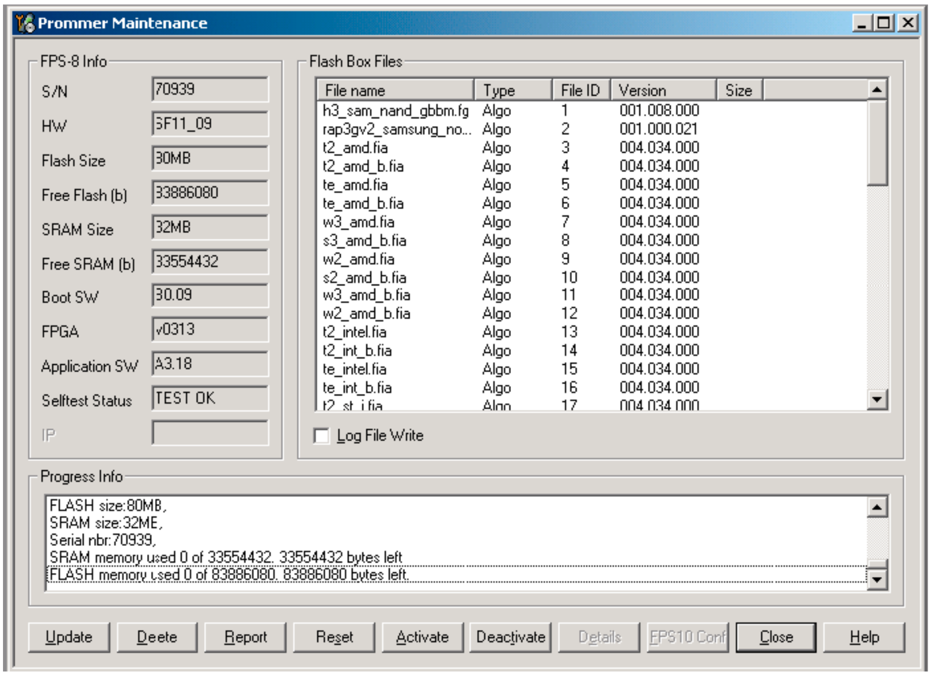
4. Wait until you are notified that update has been successful; the procedure will take a couple of minutes. Click *OK* to close the *FPS-8 Maintenance* window.



Prommer SW updated succesfully.

Figure 56 Prommer SW update done

View after successful prommer software update:


Prommer Maintenance
FPS-8 Info
Flash Box Files
☐ Log File Write
Progress Info
Update
Deete
Report
Reset
Activate
Deactivate
Details
FPS10 Conf
Close
Help

S/N	70939
HW	5F11_09
Flash Size	30MB
Free Flash (b)	33886080
SRAM Size	32MB
Free SRAM (b)	33554432
Boot SW	30.09
FPGA	v0313
Application SW	A3.18
Selftest Status	TEST OK
IP	

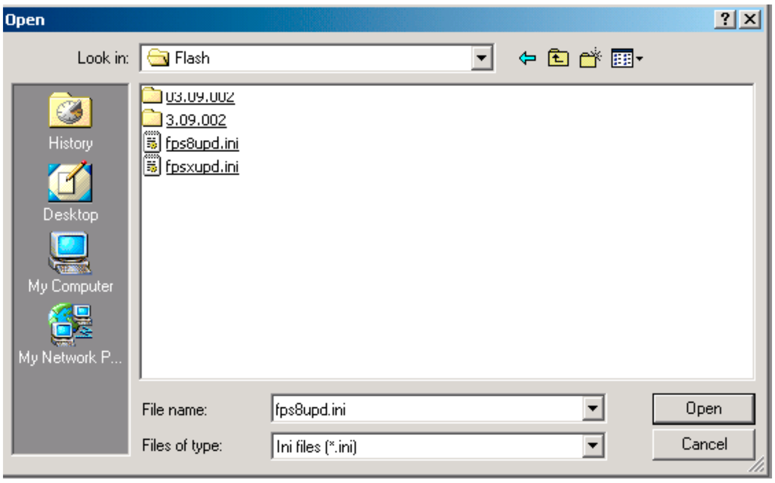
File name	Type	File ID	Version	Size
h3_sam_nand_gbbm.fg	Algo	1	001.008.000	
rap3gv2_samsung_no...	Algo	2	001.000.021	
t2_amd.fia	Algo	3	004.034.000	
t2_amd_b.fia	Algo	4	004.034.000	
te_amd.fia	Algo	5	004.034.000	
te_amd_b.fia	Algo	6	004.034.000	
w3_amd.fia	Algo	7	004.034.000	
s3_amd_b.fia	Algo	8	004.034.000	
w2_amd.fia	Algo	9	004.034.000	
s2_amd_b.fia	Algo	10	004.034.000	
w3_amd_b.fia	Algo	11	004.034.000	
w2_amd_b.fia	Algo	12	004.034.000	
t2_intel.fia	Algo	13	004.034.000	
t2_int_b.fia	Algo	14	004.034.000	
te_intel.fia	Algo	15	004.034.000	
te_int_b.fia	Algo	16	004.034.000	
t2_st_i.fia	Algo	17	004.034.000	

```
FLASH size:80MB,
SRAM size:32ME,
Serial nbr:70939,
SRAM memory used 0 of 33554432. 33554432 bytes left
FLASH memory used 0 of 83886080. 83886080 bytes left.
```

Figure 57 FPS-8 info window

Alternative steps

- FPS-8 SW can also be updated by pressing *Update* button and selecting appropriate *fps8upd.ini* file in *C:\Program Files\Nokia\Phoenix\Flash*.


Open
History
Desktop
My Computer
My Network P...
Open
Cancel

Look in: Flash

03.09.002
3.09.002
fps8upd.ini
fpsxupd.ini

File name: fps8upd.ini
Files of type: Ini files (*.ini)

Figure 58 Flash directory window

- All files can be loaded separately to FPS-8. To do this, just press the right mouse button in the *Flash box files* window and select the file type to be loaded.

  More information can be found in Phoenix *Help*.

Activating FPS-8

Context

Before FPS-8 can be successfully used for phone programming, it must first be activated. Fill in first the *FPS-8 activation request* sheet in the FPS-8 sales package and follow the instructions on the sheet (included in sales package CD-ROM or from partner web site).

When activation file is received (for example, *00000.in*), copy it to *C:\ProgramFiles\Nokia\Phoenix\BoxActivation* directory on your computer (this directory is created when Phoenix is installed).

Steps

1. Start *Phoenix Service Software*.
2. Select *Flashing -> FPS-8 maintenance*.

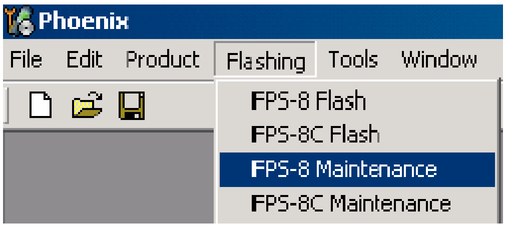
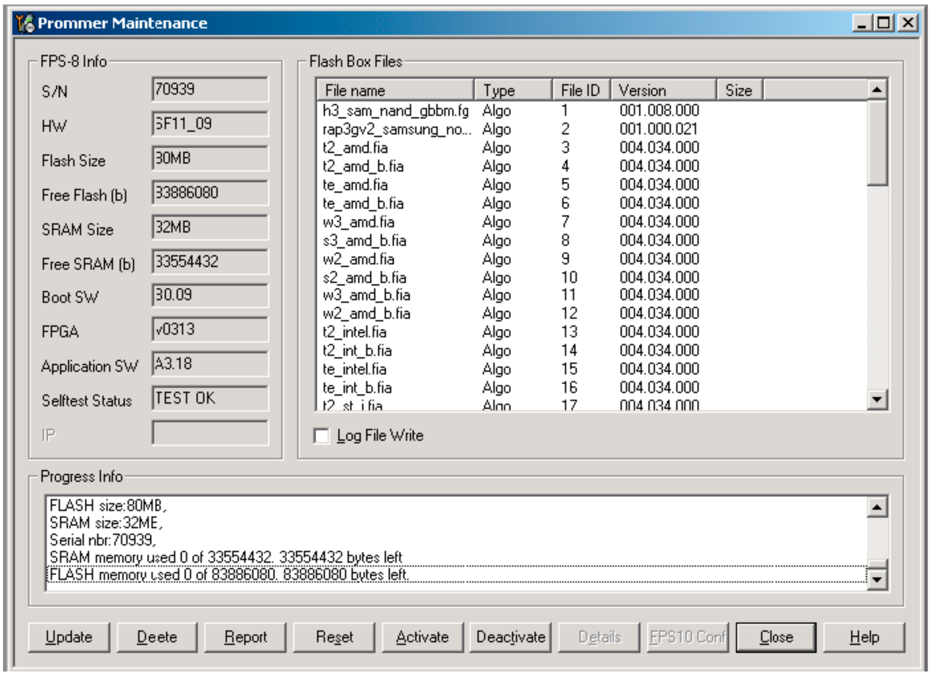

Phoenix
File
Edit
Product
Flashing
Tools
Window
FPS-8 Flash
FPS-8C Flash
FPS-8 Maintenance
FPS-8C Maintenance

Figure 59 FPS-8 maintenance

3. Click *Activate* in the *FPS-8 Maintenance* window.


Prommer Maintenance
FPS-8 Info
Flash Box Files
☐ Log File Write
Progress Info
Update
Deete
Report
Reset
Activate
Deactivate
Details
FPS10 Conf
Close
Help

S/N 70939
HW 5F11_09
Flash Size 30MB
Free Flash (b) 33886080
SRAM Size 32MB
Free SRAM (b) 33554432
Boot SW 30.09
FPGA v0313
Application SW A3.18
Selftest Status TEST OK
IP

File name	Type	File ID	Version	Size
h3_sam_nand_gbbm.fg	Algo	1	001.008.000	
rap3gv2_samsung_no...	Algo	2	001.000.021	
t2_amd.fia	Algo	3	004.034.000	
t2_amd_b.fia	Algo	4	004.034.000	
te_amd.fia	Algo	5	004.034.000	
te_amd_b.fia	Algo	6	004.034.000	
w3_amd.fia	Algo	7	004.034.000	
s3_amd_b.fia	Algo	8	004.034.000	
w2_amd.fia	Algo	9	004.034.000	
s2_amd_b.fia	Algo	10	004.034.000	
w3_amd_b.fia	Algo	11	004.034.000	
w2_amd_b.fia	Algo	12	004.034.000	
t2_intel.fia	Algo	13	004.034.000	
t2_int_b.fia	Algo	14	004.034.000	
te_intel.fia	Algo	15	004.034.000	
te_int_b.fia	Algo	16	004.034.000	
t2_st_i.fia	Algo	17	004.034.000	

```
FLASH size:80MB,
SRAM size:32ME,
Serial nbr:70939,
SRAM memory used 0 of 33554432. 33554432 bytes left
FLASH memory used 0 of 83886080. 83886080 bytes left.
```

Figure 60 FPS-8 info window

If you saved the activation file to some other directory on your PC, *Browse* to find it

4. Click *Open* to activate the box.

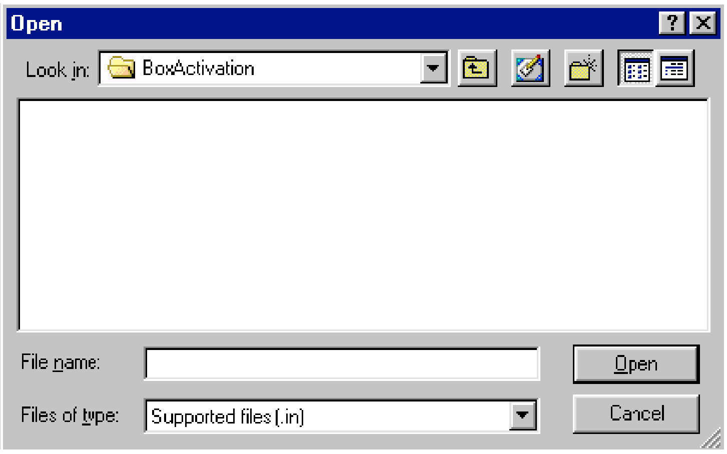

Open
Look in:
BoxActivation
File name:
Files of type:
Supported files (.in)
Open
Cancel

Figure 61 Box activation

5. Turn the FPS-8's power off and on to complete activation.

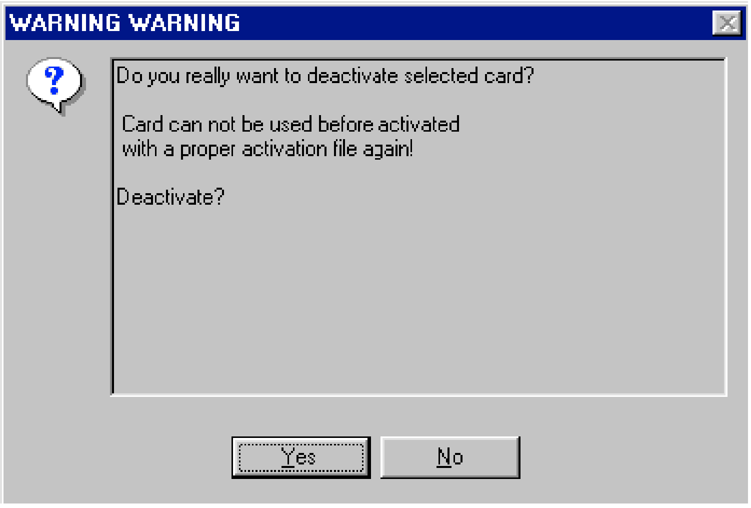
Deactivating FPS-8

Context

If there is, for example, a need to send the FPS-8 box for repair, it must be deactivated first.

Steps

1. Start *Phoenix Service Software*.
2. Choose *Maintenance -> Prommer Maintenance*.
3. In the *Prommer Maintenance* window, click *Deactivate*.
4. To confirm the deactivation, click *Yes*.


WARNING WARNING
Yes
No

Do you really want to deactivate selected card?

Card can not be used before activated
with a proper activation file again!

Deactivate?

Figure 62 Deactivation warning

The box is deactivated.

5. To complete the deactivation, restart FPS-8.

Updating JBV-1 docking station software

Before you begin

The JBV-1 docking station contains software (firmware) which can be updated. You need the following equipment to update the software:

- PC with USB connection
- operating system supporting USB (Not Win 95 or NT)
- USB Cable (can be purchased from shops or suppliers providing PC hardware and accessories)
- JBV-1 docking station
- external power supply (11-16V)

Before installation:

- Download *Jbv1_18_update.zip* file to your computer (in *C:\TEMP* for example) from your download web site.
- Close all other programs.
- Follow instructions on the screen.

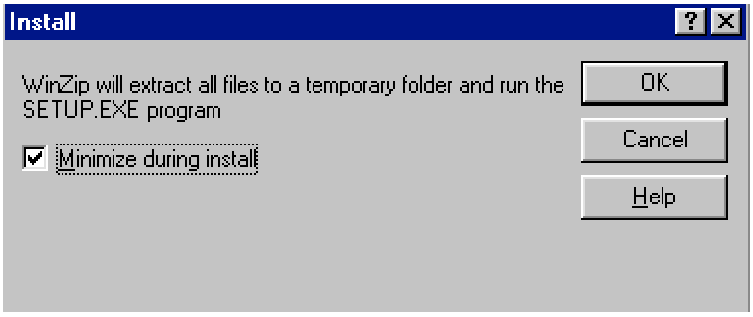
Context

The JBV-1 docking station is a common tool for all DCT-4 generation products. In order to make the JBV-1 usable with different phone models, a phone-specific docking station adapter is used.

Steps

1. Run *Jbv1_18_update.zip* file and start software installation by double clicking *Setup.exe*.

   Note: DO NOT CONNECT THE USB CABLE/JBV-1 TO YOUR COMPUTER YET!


Install

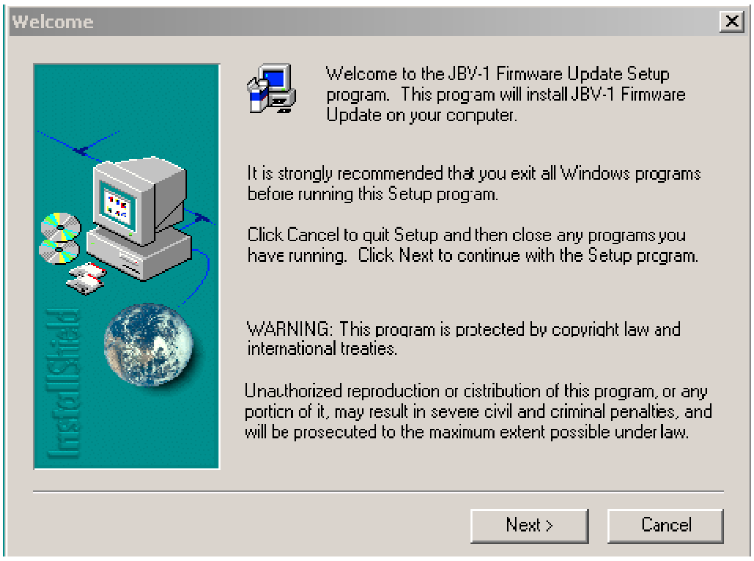
WinZip will extract all files to a temporary folder and run the SETUP.EXE program

☑ Minimize during install

Figure 63 Extracting JBV-1 update files

Files needed for JBV-1 package setup program will be extracted.

2. Read the instructions in the dialog box and click *Next* to continue.



Welcome to the JBV-1 Firmware Update Setup program. This program will install JBV-1 Firmware Update on your computer.

It is strongly recommended that you exit all Windows programs before running this Setup program.

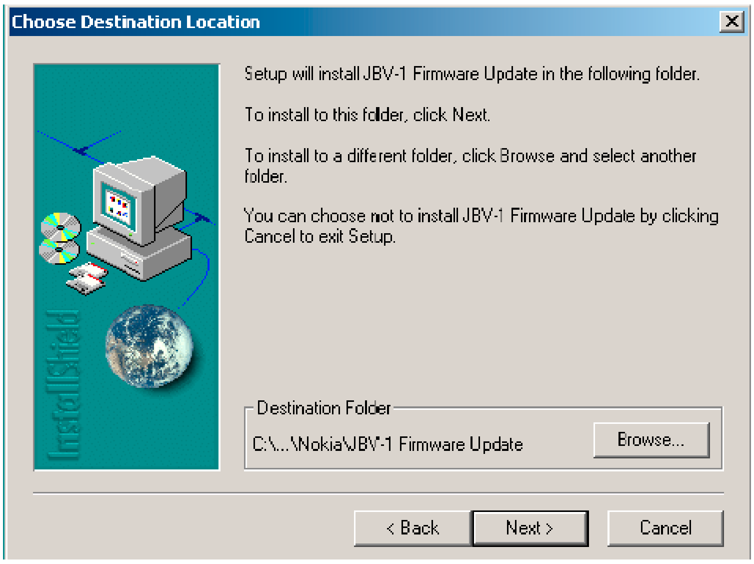
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.

WARNING: This program is protected by copyright law and international treaties.

Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.

Figure 64 JBV-1 update information

3. Accept the suggested destination folder for installing the JBV-1 SW Package, and click *Next* to continue.



Setup will install JBV-1 Firmware Update in the following folder.

To install to this folder, click Next.

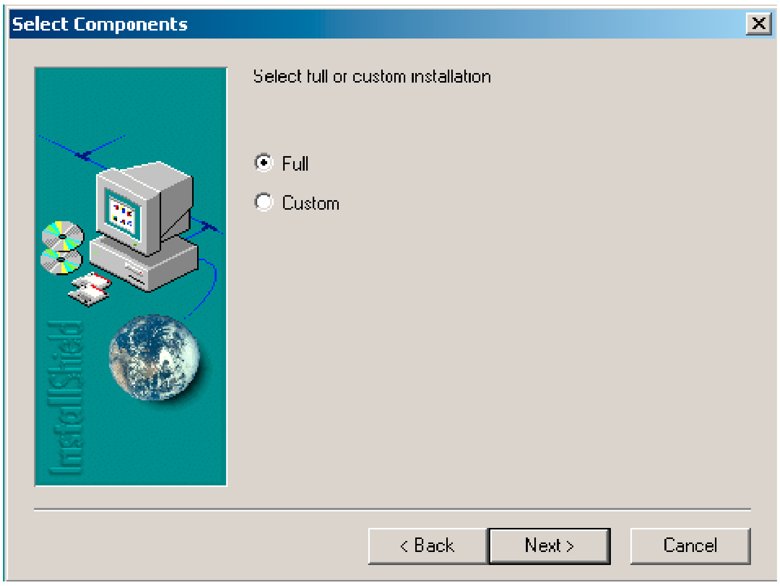
To install to a different folder, click Browse and select another folder.

You can choose not to install JBV-1 Firmware Update by clicking Cancel to exit Setup.

Destination Folder: C:\...\Nokia\JBV-1 Firmware Update

Figure 65 JBV-1 update destination folder

4. Select *Full installation* and click *Next* to continue.



Select Components
InstallShield
< Back
Next >
Cancel

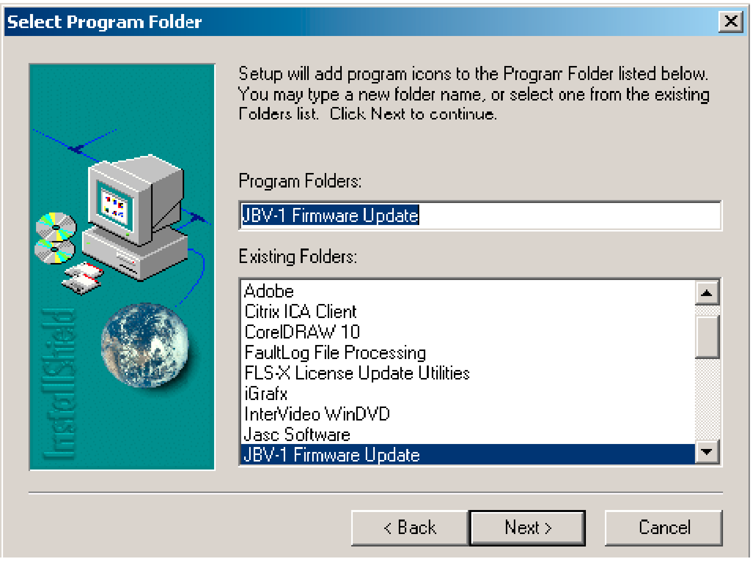
Select full or custom installation

● Full

○ Custom

Figure 66 Select installation: Full

5. A program folder is created and the software files are installed there. Click *Next* to continue.



Select Program Folder
InstallShield
< Back
Next >
Cancel

Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing Folders list. Click Next to continue.

Program Folders:

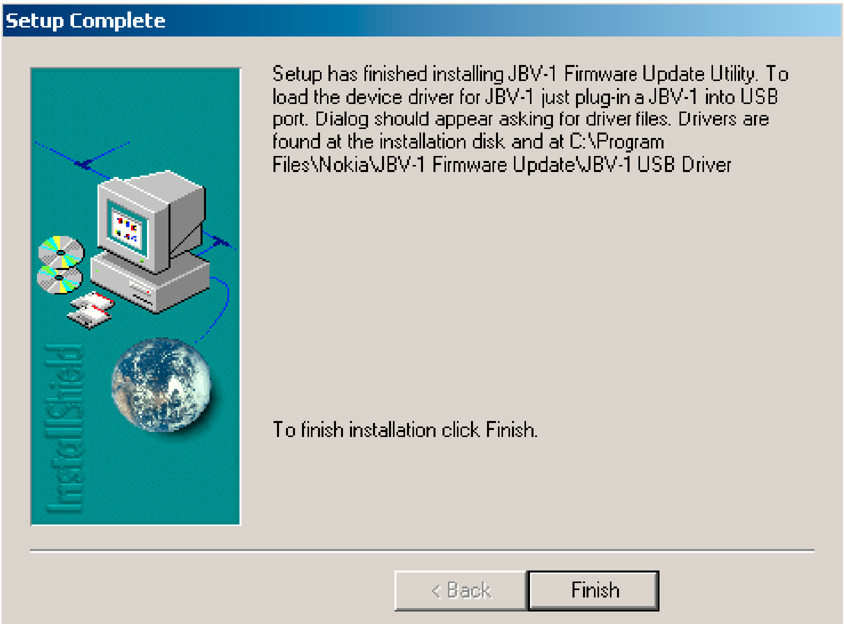
JBV-1 Firmware Update

Existing Folders:

Adobe
Citrix ICA Client
CorelDRAW 10
FaultLog File Processing
FLS-X License Update Utilities
iGrafx
InterVideo WinDVD
Jasc Software
JBV-1 Firmware Update

Figure 67 Select program folder

6. Click *Finish* to complete the installation.



Setup has finished installing JBV-1 Firmware Update Utility. To load the device driver for JBV-1 just plug-in a JBV-1 into USB port. Dialog should appear asking for driver files. Drivers are found at the installation disk and at C:\Program Files\Nokia\JBV-1 Firmware Update\JBV-1 USB Driver

To finish installation click Finish.

Figure 68 Finish JBV-1 update installation

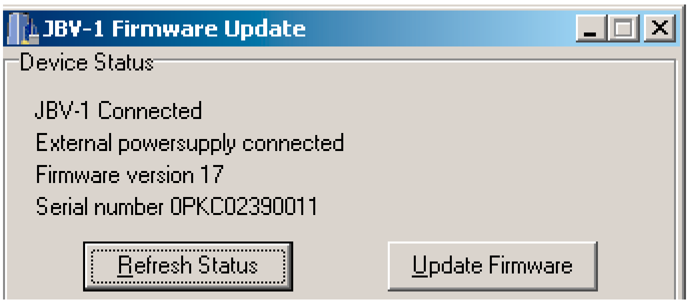
7. Connect the USB cable/JBV-1 to your computer. Connect power to JBV-1 (11-16V DC) from an external power supply, then connect the USB Cable between the JBV-1 USB connector and the PC.
8. Install or update the JBV-1 USB drivers which are delivered with the JBV-1 SW installation package.

   The drivers can be found in *C:\Program Files\Nokia\ JBV-1 Firmware Update\JBV-1USB driver*

   - If there is no previously installed JBV-1 Firmware update package installed on your computer, Windows will detect connected USB cable and detect drivers for new HW. You will be prompted about this, please follow the instructions and allow Windows to search and install the best drivers available.
   - If there is a previously installed JBV-1 Firmware update package (v.17 or older) on your computer, please update the JBV-1 USB driver. Please see the *readme.txt* file in *C:\Program Files\Nokia\JBV-1 Firmware Update\JBV-1USB driver* folder for instructions on how to update the JBV-1 USB Driver.

   After you have installed or updated the JBV-1 USB driver, the actual JBV-1 SW update can begin.
9. Go to folder *C:\Program Files\Nokia\JBV-1 Firmware Update\JBV-1 Firmware Update* and start JBV-1 Update SW by double clicking *fwup.exe*.

   JBV-1 Firmware update starts and shows current status of the connected JBV-1. If firmware version read from your JBV-1 is not the latest one available (v.17 or older), it needs to be updated to version 18 by clicking *Update Firmware*.
10. Choose *Refresh Status* to check the SW version.



JBV-1 Connected
External powersupply connected
Firmware version 17
Serial number 0PKC02390011

Figure 69 Checking JBV-1 SW version

11. Choose file *JBV1v18.CDE* and click *Open* to update your JBV-1 to a new version (v.18).

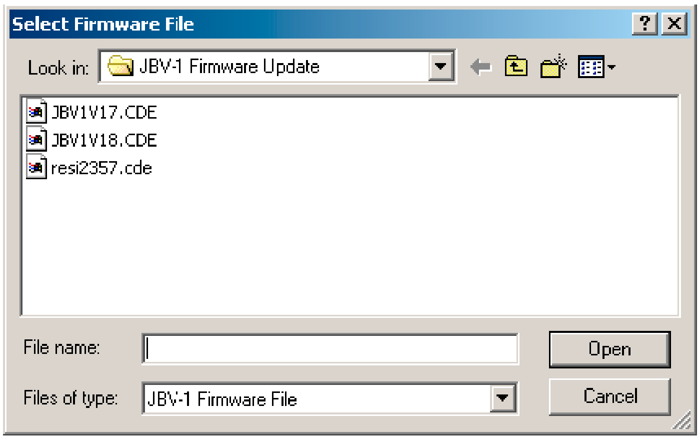
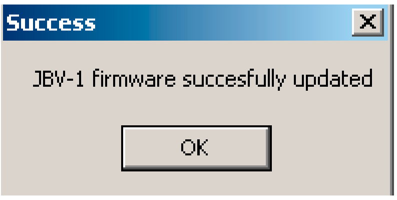

Select Firmware File
Look in: JBV-1 Firmware Update
JBV1V17.CDE
JBV1V18.CDE
resi2357.cde
File name:
Files of type: JBV-1 Firmware File
Open
Cancel

Figure 70 JBV-1 update directory window

Wait until you hear a "click" from the JBV-1.

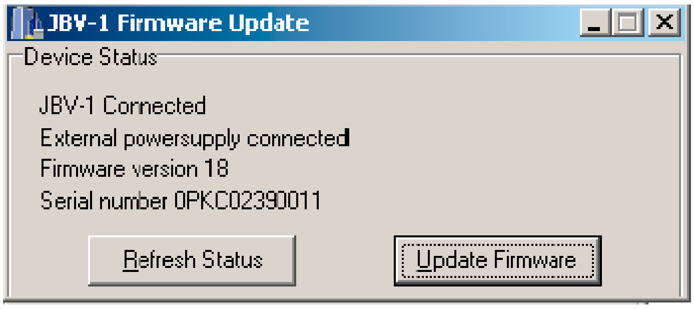
The older SW file *JBV1v17.CDE* is visible in this view only if the previous JBV-1 SW package has been installed on your computer.

12. Click OK to see the current JBV-1 status (after a successful update).


Success

JBV-1 firmware succesfully updated

Figure 71 JBV-1 SW update done


JBV-1 Firmware Update
Device Status

JBV-1 Connected
External powersupply connected
Firmware version 18
Serial number 0PKC02390011

Refresh Status
Update Firmware

Figure 72 JBV-1 SW status

You have now updated the software of your JBV-1 docking station and it is ready for use.

Next action

If you have several docking stations you need to update, disconnect the power and USB cables from the previous one and connect them to the next docking station. First, click *Refresh Status* to see the current SW version and then *Update Firmware* to update the software.

After you have updated all docking stations, close the *JBV-1 Firmware Update* dialog box.

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4 — Service Tools

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- SF-50....4–13
- SK-8....4–14
- SK-9....4–15
- SPS-1....4–15
- SRT-6....4–16
- SS-15....4–16
- SS-34....4–16
- ST-15....4–16
- XCS-1....4–17
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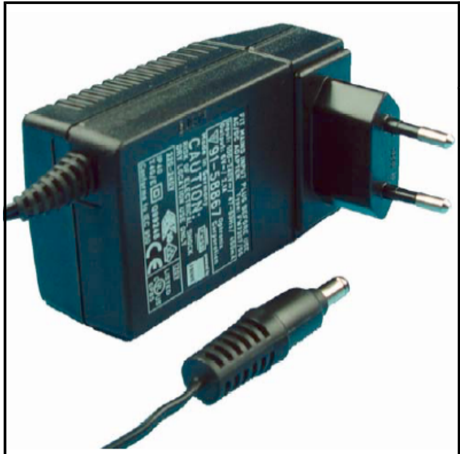
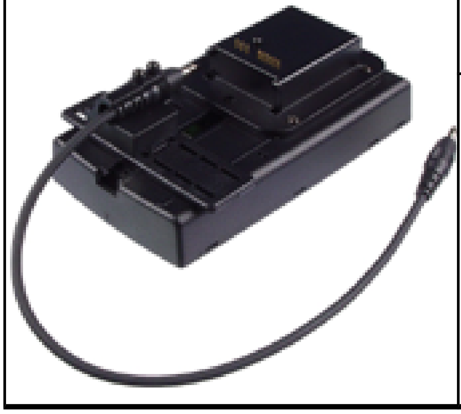
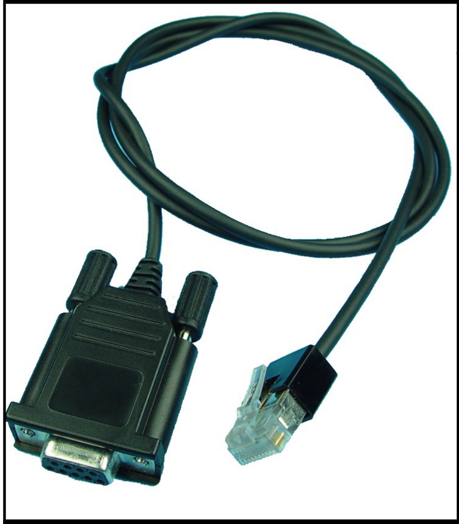
Service tools

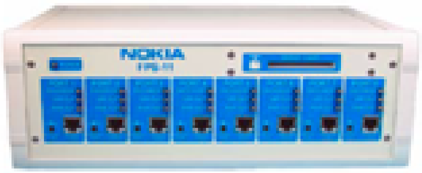
List of Service Tools

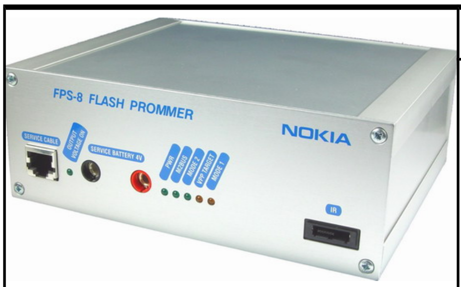
The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product , refer to various concepts.

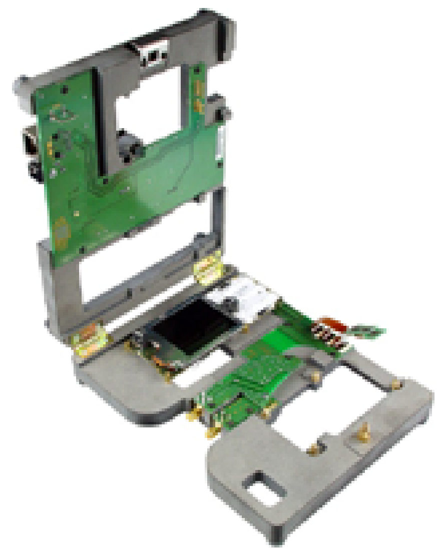
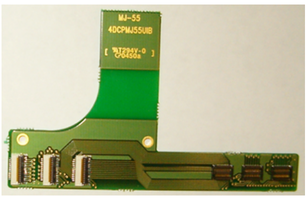
	ACF-8	Universal power supply	0680032
	ACF-8 universal power supply is used to power FPS-8. ACF-8 has 6V DC and 2.1A output.		
	AXS-4	Service cable	0730090
	The AXS-4 D9-D9 service cable is used to connect two 9 pin D connectors for example between PC and FPS-8. The cable length is 2 meters.		
	CA-10DS	Bi-directional Parallel Cable	0730298
	Bi-Directional parallel cable included in FPS-8 sales pack.		

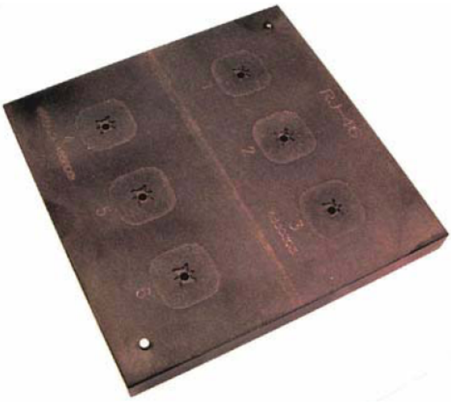
	CA-31D	USB cable	0730322
	The USB cable is used to connect FPS-10 or FPS-11 to a PC computer. It is included in the FPS-10 and FPS-11 sales packages.		
	CA-41PS	Power cable	0730329
	The DC cable is used to connect the POS flash adapter to FPS-10.		
	CA-5S	DC cable	0730283
	The DC cable CA-5S is used to connect JBV-1 to the phone charger jack for ADC/VCHAR/ICHAR calibration **Note:** Old SCB-3 can be used as well.		
	DA-44	Docking station adapter	0780414
	DA-44 is used together with JBV-1 as one unit. The adapter makes signal connections to the phone.		

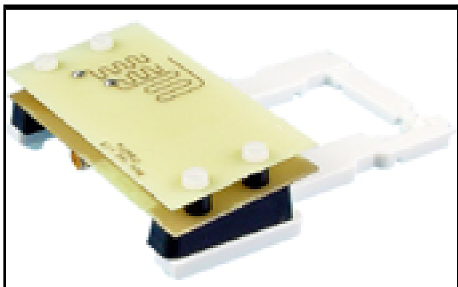
<table>
<tr><td rowspan="2"></td><td>DAU-9S</td><td>MBUS cable</td><td>0730108</td></tr>
<tr><td colspan="3">The MBUS cable DAU-9S has a modular connector and is used, for example, between the PC's serial port and module jigs, flash adapters or docking station adapters.</td></tr>
<tr><td rowspan="2"> </td><td>FLC-2</td><td>DC cable</td><td>0730185</td></tr>
<tr><td colspan="3">FLC-2 is used with a flash adapter to supply a controlled operating voltage.</td></tr>
<tr><td rowspan="2"> </td><td>FLS-4S</td><td>Flash device</td><td>FLS-4S sales pack – Europe/ Africa:0080541,
APAC:0080542,
Americas:0080543</td></tr>
<tr><td colspan="3">FLS-4S is a dongle and flash device incorporated into one package, developed specifically for POS use.</td></tr>
</table>

	FPS-10	Flash prommer	0086189
	FPS-10 interfaces with: • PC • Control unit • Flash adapter • Smart card FPS-10 flash prommer features: • Provides flash functionality for BB5 terminals • Smart Card reader for SX-2 or SX-4 • Forwards USB traffic through it • Provides USB to FBUS/Flashbus conversion • Provides LAN to FBUS/Flashbus and USB conversion • Vusb output switchable by PC command FPS-10 sales package includes: • FPS-10 prommer (0770503) • Power Supply with 5 country specific cords (0675525) • USB cable (0730322)		
	FPS-11	Parallel flash prommer	0770758
	FPS-11 interfaces with: • PC • Control unit • Flash adapter • Smart card FPS-11 flash prommer features: • Can flash up to 8 phones at a time, controlled by one PC • Communication method between PC and FPS-11 is single USB2.0 • No need for external power for powering up phones • Smart Card reader for SX-2 and SX-4 • Updates software • Future feature: will support all DCT-4 protocols and models FPS-11 sales package includes: • FPS-11 • Power Supply for FPS-11 • EUR, UK, USA Power cords • USB2.0 cable		

	FPS-8	FLASH prommer	0080321
	The flash prommer FPS-8 is used for example with flash adapters, docking station adapters and flash/docking stations. Power is supplied to FPS-8 from the universal power supply, ACF-8. The sales pack includes: • FPS-8 flash prommer (0750123) • FPS-8 activation sheet (9359289) • ACF-8 universal power supply (0680032) • AXS-4 service cable (D9-D9) (0730090) • Printer cable (0730029)		
	JBT-9	Bluetooth test and interface box (sales pack)	0081490
	The JBT-9 testbox is a generic device to perform Bluetooth bit error rate testing and doing cordless FBUS connection via Bluetooth. An ACP-8x charger is needed for BER testing and AXS-4 cable in case of cordless testing interface usage. • JBT-9 testbox (0770336) • Installation and warranty information (9360613)		
	JBV-1	Docking station	0770298
	The JBV-1 docking station is a general tool that has been designed for calibration and software update use. The JBV-1 is used together with a docking station adapter as one unit In calibration mode the JBV-1 is powered by an external power supply: 11-16V DC. When flashing the power for the phone can be taken from the FPS-8 or external power supply: 11-16 V DC. **Note:** JBV-1 main electrical functions are: • adjustable VBATT calibration voltage, current measurement limit voltage: VCHAR, current measurement: ICHAR • adjustable ADC calibration voltage via BTEM and the BSI signal • BTEMP and BSI calibration resistor • signal from FBUS to the phone via the parallel jig • control via FBUS or USB • Flash OK/FAIL indication		

<table>
<tr><td rowspan="2"></td><td>MJ-55</td><td>Module jig</td><td>0780413</td></tr>
<tr><td colspan="3">The MJ-55 module jig is used for testing the following modules:
• User interface
• Baseband and RF on system module
Note: The nominal supply voltage for MJ-55 is +4.0V. The supply voltage must not exceed +6.5V (min. 3.0V).
•
<table>
<tr><td> </td><td>Spare flex unit</td><td>0780546</td></tr>
<tr><td></td><td>Spare UI unit</td><td>0780547</td></tr>
</table></td></tr>
<tr><td rowspan="2"> </td><td>PCS-1</td><td>Power cable</td><td>0730012</td></tr>
<tr><td colspan="3">The PCS-1 power cable (DC) is used with a docking station, a module jig or a control unit to supply a controlled operating voltage.</td></tr>
<tr><td rowspan="2"> </td><td>PKD-1</td><td>SW security device</td><td>0750018</td></tr>
<tr><td colspan="3">SW security device is a piece of hardware enabling the use of the service software when connected to the parallel (LPT) port of the PC.
Without the device, it is not possible to use the service software.
Printer or any such device can be connected to the PC through the device if needed.
Caution: Do not connect the PKD-1 to the serial port.</td></tr>
</table>

<table>
<tr><td rowspan="2"></td><td>RJ-46</td><td>Antenna switch rework jig</td><td>0780374</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td rowspan="2"> </td><td>RJ-59</td><td>Soldering jig</td><td>0780430</td></tr>
<tr><td colspan="3">The soldering jig RJ-59 is used for soldering and as a rework jig for system module. It is made of lead-free rework compatible material.</td></tr>
</table>



SA-65	RF Coupler	0780415

SA-65 RF Coupler is used for Go/No-Go test after changing components in the RF part of the phone.

The SA-65 is mounted on the docking station adapter, after which the phone can be placed in the docking station adapter.

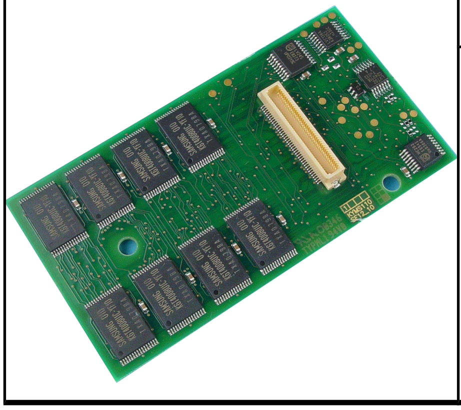
RF attenuations:

- **Table 2 TX (dB)**

Band	Channel	Attenuation [dB]
900	975	7.6
	124	6
1800	512	19
	885	13.7
1900	512	9.7
	810	8.5

Table 3 RX (db)

Band	Channel	Attenuation [dB]
900	975	6.3
	124	10
1800	512	12.3
	885	9.3
1900	512	8.3
	810	9.2



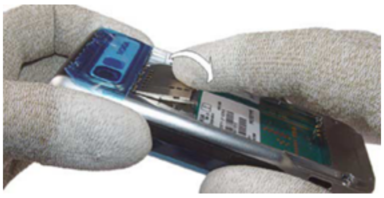
SF-12	SRAM Module for FPS-8	0080346

	SF-50	POS (point of sales) flash adapter	0780416

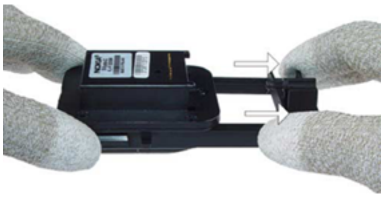
The POS flash adapter SF-50 is used in the place of phone's normal battery during service, to supply a controlled operating voltage and to connect to flash pads. See also "POS Flash concept".

Instructions

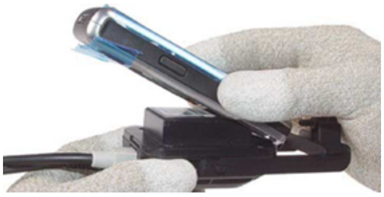
1 Close MMC Lid before inserting the Flash Adapter.



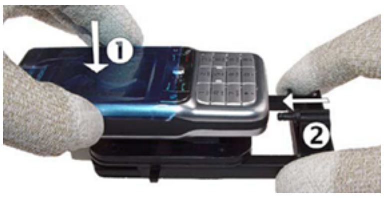
2 Open the slide in arrow direction as shown in the picture.



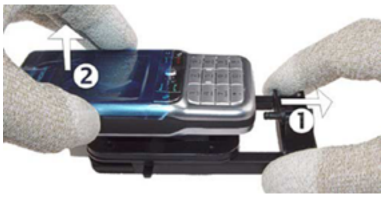
3 Insert the Flash Adapter like a battery, start at the battery connector side.

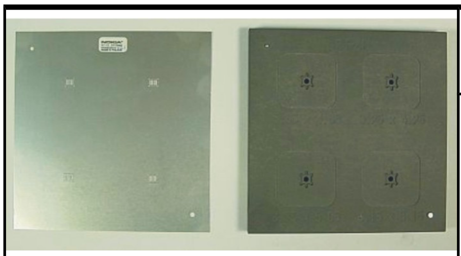


4 Now, push down the phone, do not use too much force. Move the slide towards the device to connect it with the DC-Jack.



5 Use the shown order to remove the phone from the Flash Adapter.



	SK-8	LGA rework kit for Kaede	0274550

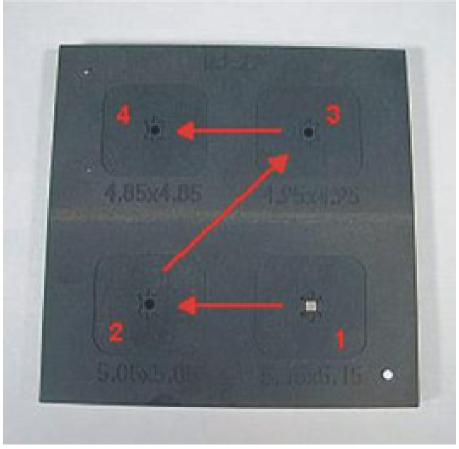
SK-8 is used to print solder paste on Kaede USB component (NMP code: 4342163) when the component is reworked.

SK-8 consists of ST-9 (NMP code: 0770727) Stencil and RJ-29 (NMP code: 0770728) rework jig.

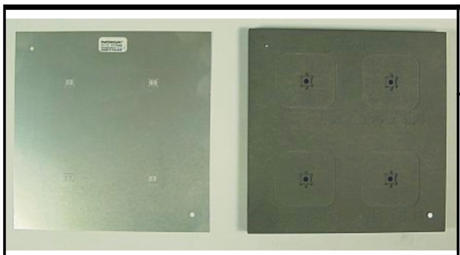
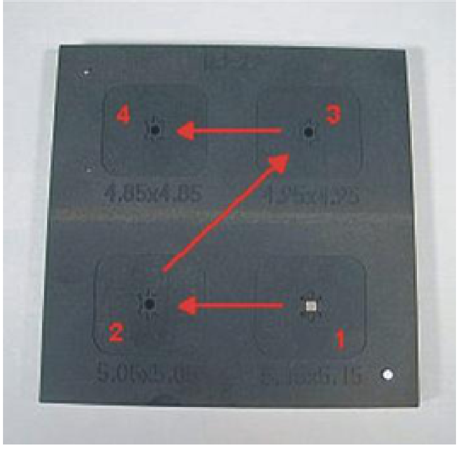
Due to the large mechanical tolerance of the component, the following procedure is necessary:

Instructions

1. Put the component into the rework jig. The component should be placed in the best fit location which is determined by placing the component in the largest location first, and if this is too large, re-position it to the next location. This should be carried out until the best fit location is found.



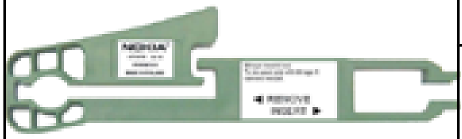
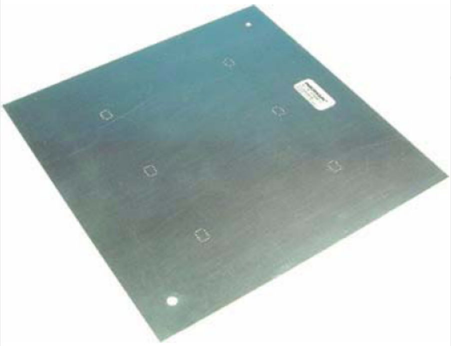
2. Once the best fit location has been found, leave the component there and put the stencil on top of the jig and the component.
3. Put soldering paste on the component properly.
4. Remove the stencil and the component from the jig.
5. Start the soldering process.

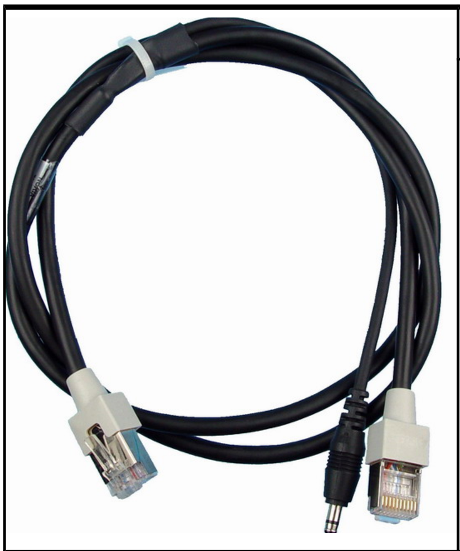
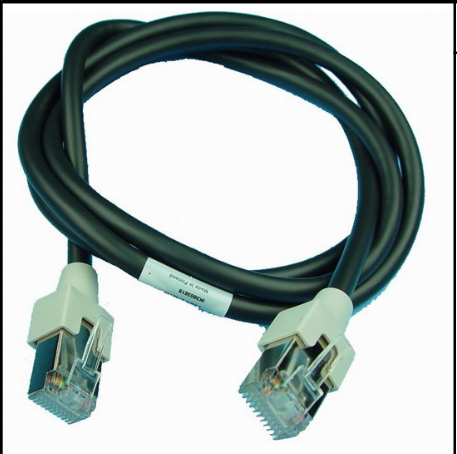
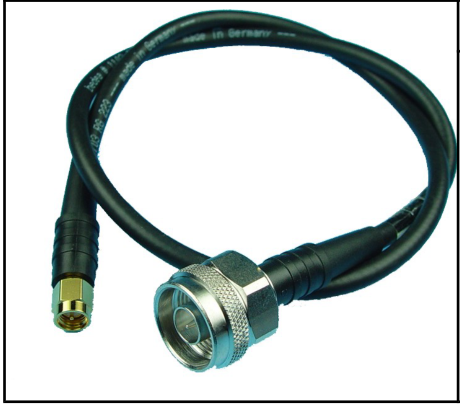
<table>
<tr>
<td rowspan="2"></td>
<td>SK-9</td>
<td>LGA rework kit for MicroPA</td>
<td>0274819</td>
</tr>
<tr>
<td colspan="3">SK-9 is used to print solder paste on MicroPA component (NMP code: 4355641) when the component is reworked.
SK-9 consists of ST-13 (NMP code: 0770848) stencil and RJ-21 (NMP code: 0770849) rework jig.
Due to the large mechanical tolerance of the component, the following procedure is necessary:
Instructions
1 Put the component into the rework jig. The component should be placed in the best fit location which is determined by placing the component in the largest location first, and if this is too large, re-position it to the next location. This should be carried out until the best fit location is found.


2 Once the best fit location has been found, leave the component there and put the stencil on top of the jig and the component.
3 Put soldering paste on the component properly.
4 Remove the stencil and the component from the jig.
5 Start the soldering process.</td>
</tr>
<tr>
<td rowspan="2">

Made in Germany
50mm
Rücken Säurefest
NOKIA
SPS-1 0770381
CK1303618
MADE IN FINLAND

</td>
<td>SPS-1</td>
<td>Soldering Paste Spreader</td>
<td>0770381</td>
</tr>
<tr>
<td colspan="3"></td>
</tr>
</table>

	SRT-6	Opening tool	0770431
	SS-15	Camera removal tool	0770755
	The camera removal tool SS-15 is used to remove/attach the camera module from/to the socket on the phone PWB.		
	SS-34	Flex opening tool	0780396
	ST-15	Antenna switch rework stencil	0780412

<table>
<tr><td rowspan="2"></td><td>XCS-1</td><td>Service cable</td><td>0730218</td></tr>
<tr><td colspan="3">The XCS-1 service cable is used to connect FLS-4S to the POS flash adapter for supplying a controlled operating voltage and data connection.</td></tr>
<tr><td rowspan="2"></td><td>XCS-4</td><td>Modular cable</td><td>0730178</td></tr>
<tr><td colspan="3">XCS-4 is a shielded (one specially shielded conductor) modular cable for flashing and service purposes.</td></tr>
<tr><td rowspan="2"></td><td>XRF-1</td><td>RF cable</td><td>0730085</td></tr>
<tr><td colspan="3">The RF cable is used to connect, for example, a module repair jig to the RF measurement equipment.
SMA to N-Connector ca. 610mm.
Attenuation for:
• GSM850/900: 0.3+-0.1 dB
• GSM1800/1900: 0.5+-0.1 dB
• WLAN: 0.6+-0.1dB</td></tr>
</table>

Service software concepts

Flash concept with FPS-8

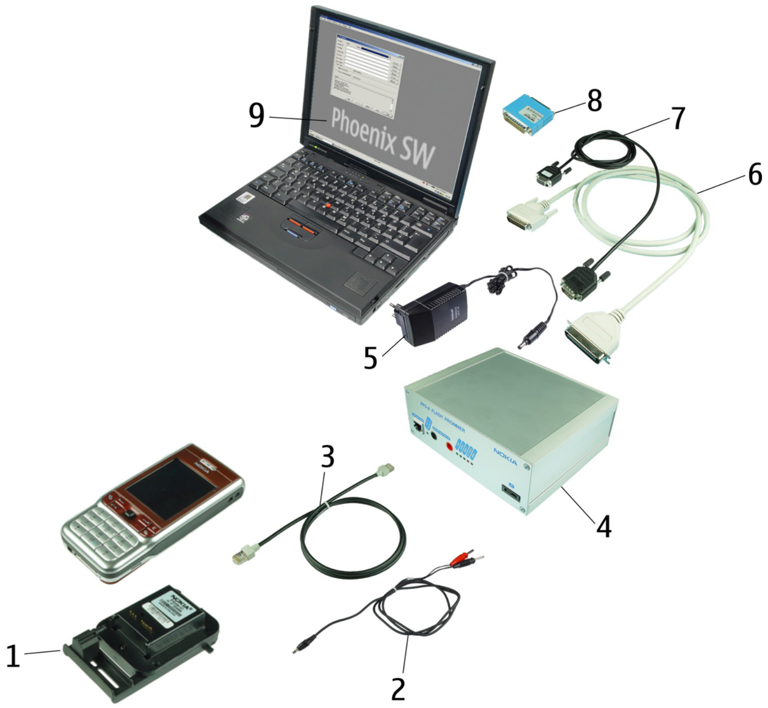


Figure 73 Flash concept

Item	Description	Type	Code
1	Point of Sales flash loading adapter	SF-50	0780416
2	Power cable	FLC-2	0730185
3	Modular cable	XCS-4	0730178
4	Flash prommer box sales pack	FPS-8	0080321
5	AC Charger	ACF-8, included in FPS-8 sales pack	0680032
6	Printer cable	CA-10DS, included in FPS-8 sales pack	0730298
7	D9 – D9 cable	AXS-4, included in FPS-8 sales pack	0730090
8	Software protection key	PKD-1	0750018
9	Computer with Phoenix SSW		
	SRAM Module (3 pcs needed inside FPS-8)	SF-12	0080346 (Code includes one SRAM module)

Note: More than 32MB SRAM required in FPS-8.

POS flash concept

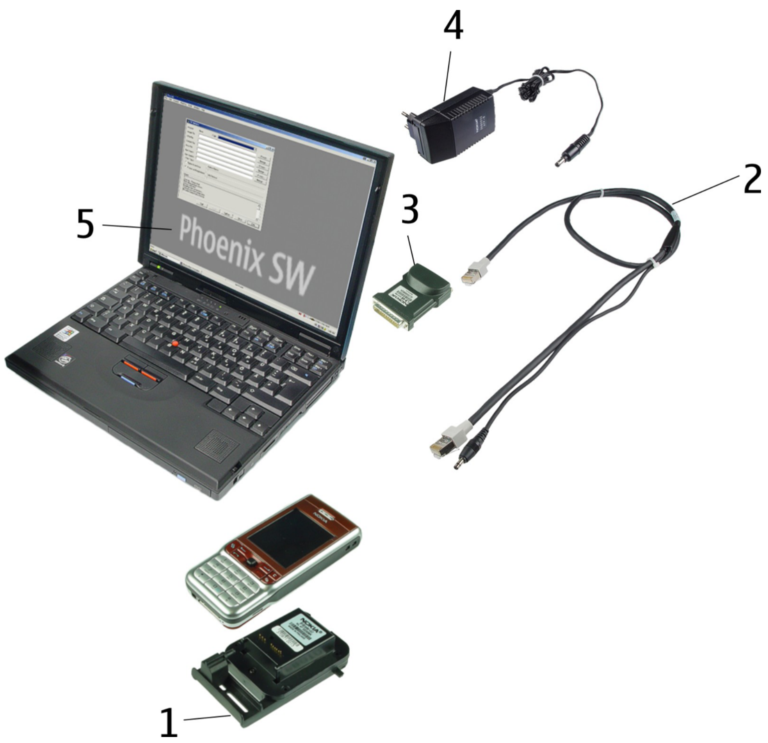


Figure 74 POS flash concept

Item	Description	Type	Code
1	Point of Sales flash loading adapter	SF-50	0780416
2	Service cable	XCS-1	0730218
3	FLS-4S sales pack for EMEA	FLS-4S	0080541
4	AC charger	ACF-8, included in FLS-4S sales pack	0680032
5	Computer with Phoenix SSW		

POS flash concept with FPS-10

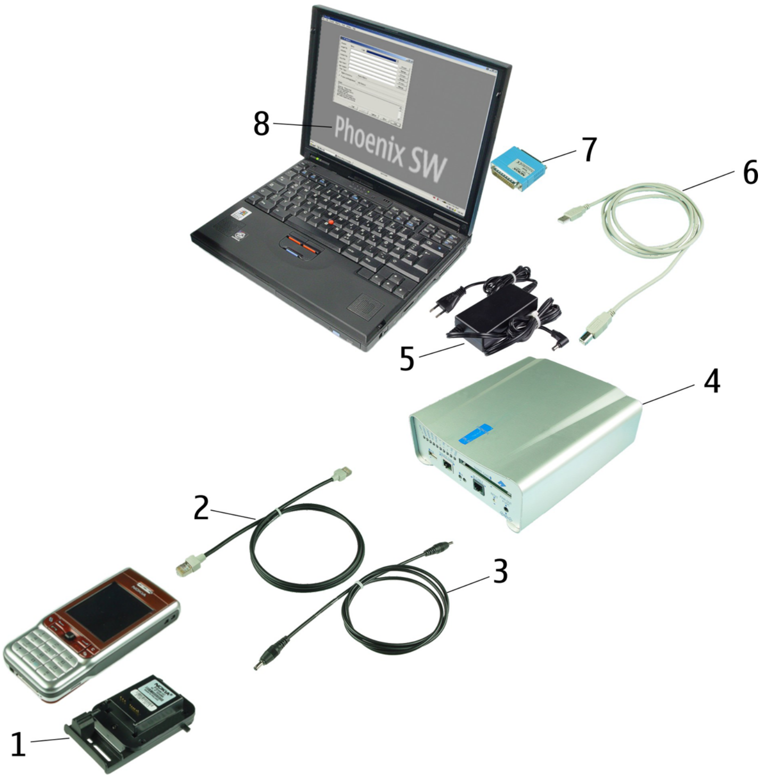


Figure 75 POS flash concept with FPS-10

Item	Description	Type	Code
1	Point of Sales flash loading adapter	SF-50	0780416
2	Service cable	XCS-4	0730178
3	Power cable	CA-41PS	0730329
4	Flash prommer box	FPS-10	0086189
5	AC charger	AC-33 included in sales kit	0675525
6	USB cable	CA-31D included in sales kit	0730322
7	Software protection key	PKD-1	0750018
8	Computer with Phoenix SSW		

POS flash concept with FPS-11

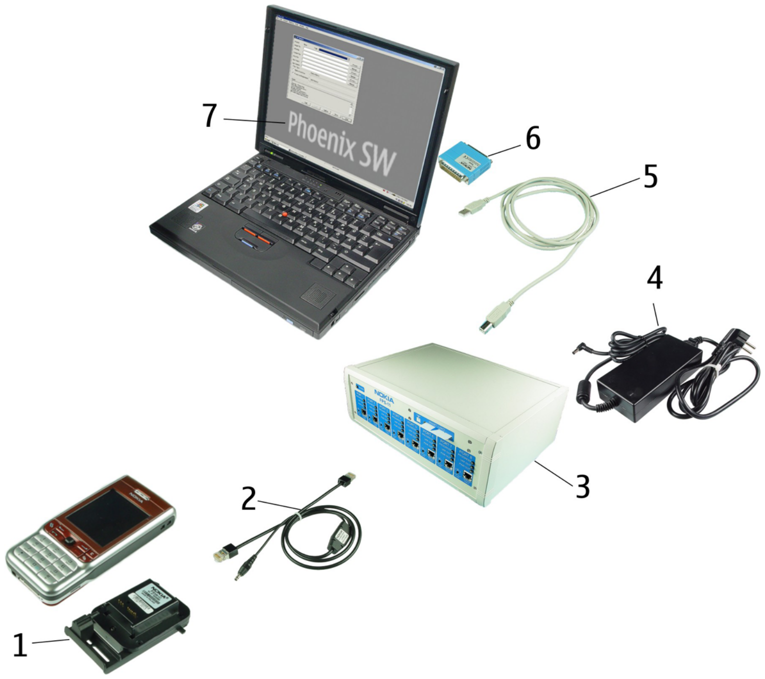


Figure 76 POS flash concept with FPS-11

Item	Description	Type	Code
1	Point of Sales flash loading adapter	SF-50	0780416
2	Service cable	CA-28DS	0730319
3	Flash prommer box	FPS-11	0770758
4	AC charger	AC-33 included in sales kit	0675525
5	USB cable	CA-31D included in sales kit	0730322
6	Software protection key	PKD-1	0750018
7	Computer with Phoenix SSW		

JBV-1 flash concept with FPS-8

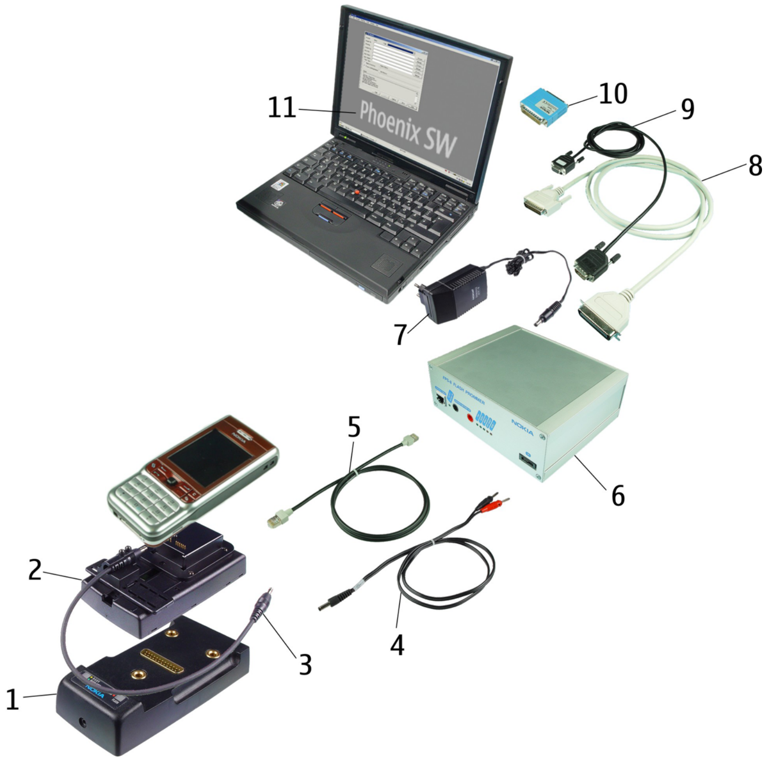


Figure 77 JBV-1 flash concept with FPS-8

Item	Description	Type	Code
1	Docking station	JBV-1	0770298
2	Docking station adapter	DA-44	0780414
3	DC cable	CA-5S	0730283
4	Power cable	PCS-1	0730012
5	Modular cable	XCS-4	0730178
6	Flash prommer box sales pack	FPS-8	0080321
7	AC Charger	ACF-8, included in FPS-8 sales pack	0680032
8	Printer cable	CA-10DS, included in FPS-8 sales pack	0730298
9	D9 – D9 cable	AXS-4, included in FPS-8 sales pack	0730090
10	Software protection key	PKD-1	0750018
11	Computer with Phoenix SSW		

Item	Description	Type	Code
	SRAM Module (3 pcs needed inside FPS-8)	SF-12	0080346 (Code includes one SRAM module)

Note: More than 32MB SRAM required in FPS-8.

POS flash concept with FPS-10

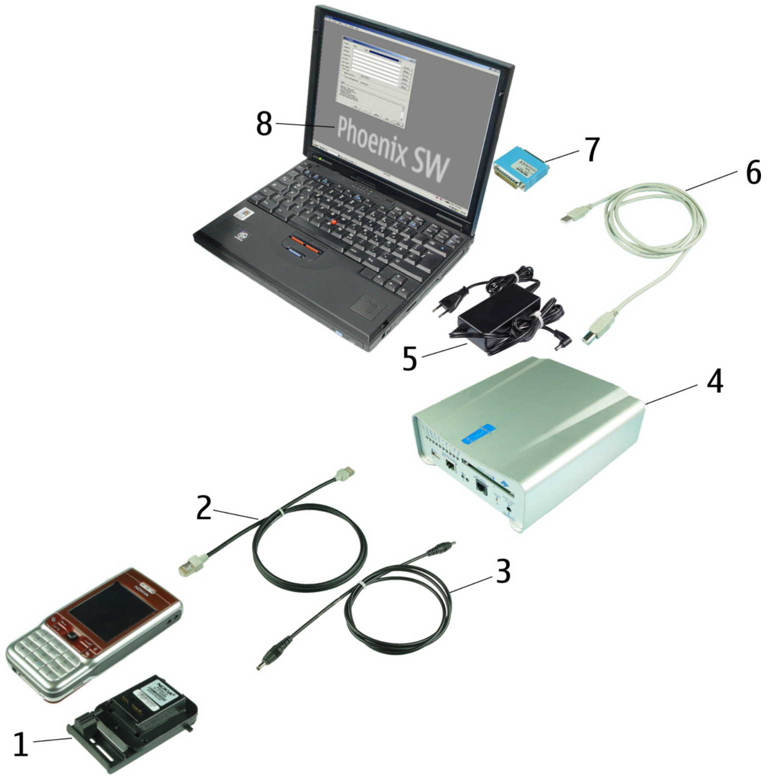


Figure 78 POS flash concept with FPS-10

Item	Description	Type	Code
1	Point of Sales flash loading adapter	SF-50	0780416
2	Service cable	XCS-4	0730178
3	Power cable	CA-41PS	0730329
4	Flash prommer box	FPS-10	0086189
5	AC charger	AC-33 included in sales kit	0675525
6	USB cable	CA-31D included in sales kit	0730322
7	Software protection key	PKD-1	0750018
8	Computer with Phoenix SSW		

Module jig flash concept with FPS-8

Flashing with MJ-55 is recommended in local mode.

The following equipment is required for the AMS SW update when the system module is placed in the module jig MJ-55 and connected through an FPS-8 set-up:

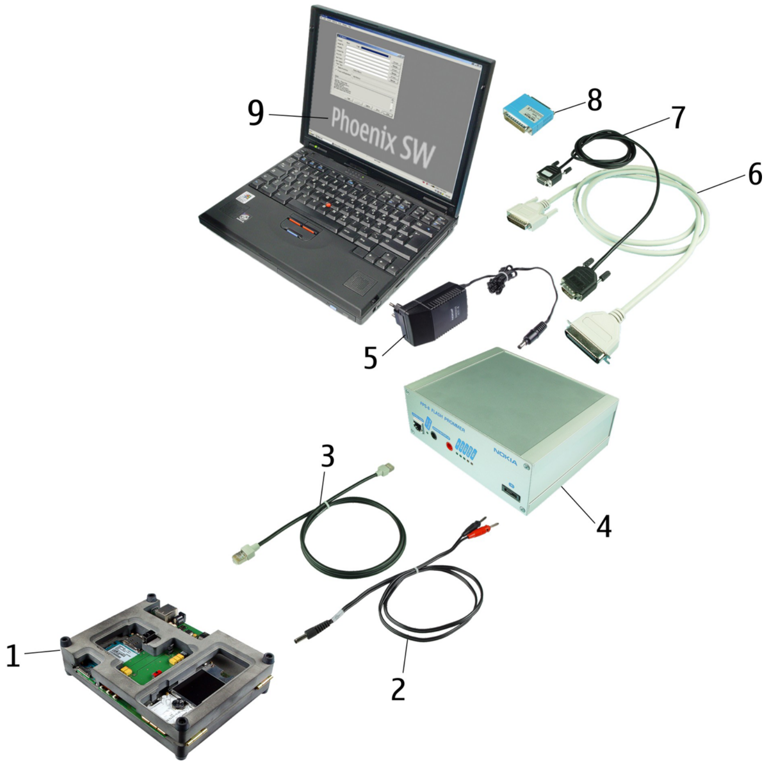


Figure 79 Module jig flash concept with FPS-8

Item	Description	Type	Code
1	Module jig	MJ-55	0780413
2	Power cable	PCS-1	0730012
3	Modular cable	XCS-4	0730178
4	Flash prommer box sales pack	FPS-8	0080321
5	AC Charger	ACF-8, included in FPS-8 sales pack	0680032
6	Printer cable	CA-10DS, included in FPS-8 sales pack	0730298
7	D9 – D9 cable	AXS-4, included in FPS-8 sales pack	0730090
8	Software protection key	PKD-1	0750018
9	Computer with Phoenix SSW		

Item	Description	Type	Code
	SRAM Module (3 pcs needed inside FPS-8)	SF-12	0080346 (Code includes one SRAM module)

Note: More than 32MB SRAM required in FPS-8.

Module jig service concept

This concept is for troubleshooting and RF calibration.

MJ-55 is intended for use with an external power supply.

MJ-55 input voltage: normal +4 V, maximum +6.5 V.

Ensure that the jumper is set for voltage regulation before the external power supply is connected.

When FPS-8 is used as the power supply (4 V), the jumper should be set to bypass regulator.

EM calibrations including Zocus are only done with JBV-1. Module jig MJ-55 does not support Zocus calibration.

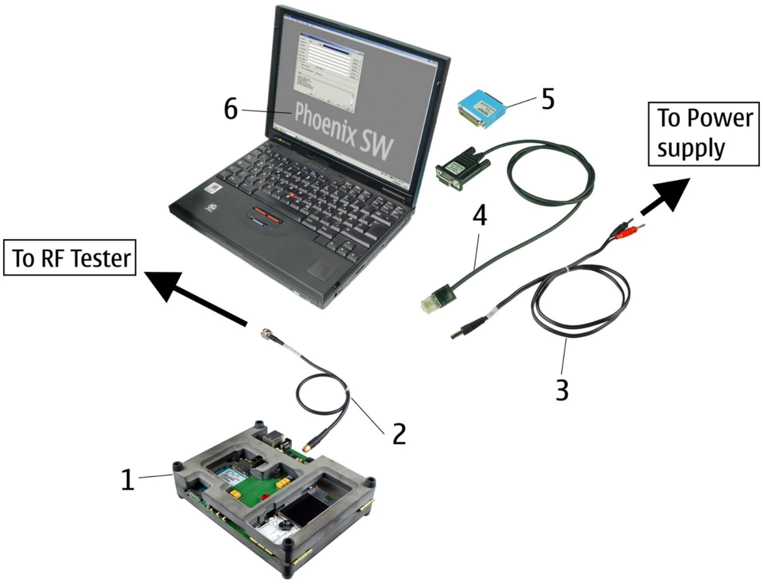


Figure 80 Module jig service concept

Item	Description	Type	Code
1	Module jig	MJ-55	0780413
2	RF cable	XRF-1	0730085
3	Power cable	PCS-1	0730012
4	MBUS cable	DAU-9S	0730108
5	Software protection key	PKD-1	0750018
6	Computer with Phoenix SSW		

JBV-1 service concept

This concept is for BB calibration.

EM calibration including Zocus should be carried out in JBV-1 and DA-44.

Power to JBV-1 should be supplied from an external DC power supply, NOT A FLASH PROMMER.

JBV-1 input voltage: normal +12V, maximum +16V.

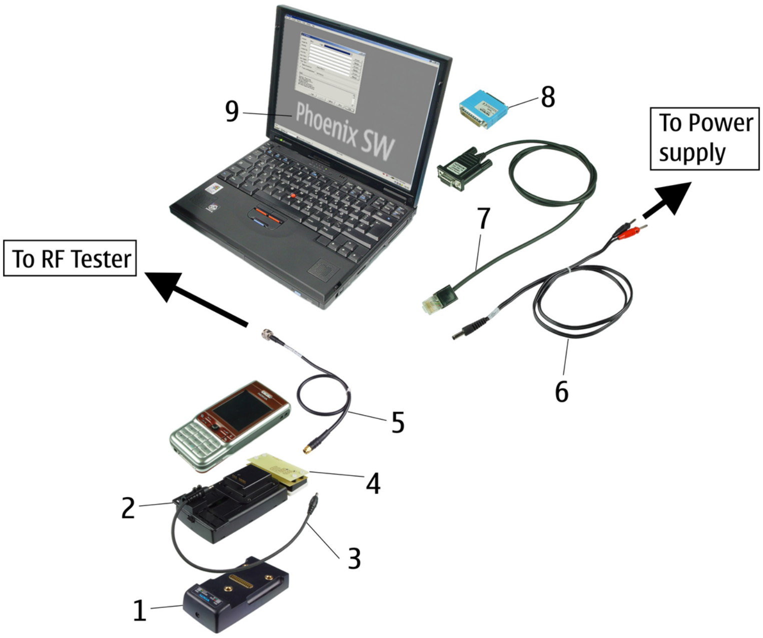


Figure 81 JBV-1 service concept

Item	Description	Type	Code
1	Docking station	JBV-1	0770298
2	Docking station adapter	DA-44	0780414
3	DC cable	CA-5S	0730283
4	RF coupler	SA-65	0780415
5	RF cable	XRF-1	0730085
6	Power cable	PCS-1	0730012
7	MBUS cable	DAU-9S	0730108
8	Software protection key	PKD-1	0750018
9	Computer with Phoenix SSW		

5 — Disassembly and reassembly instructions

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Reassembly instructions....5–11

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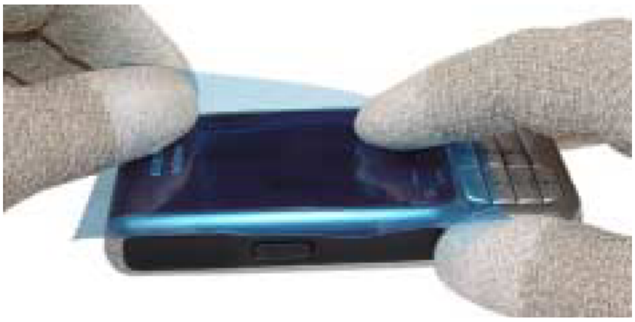
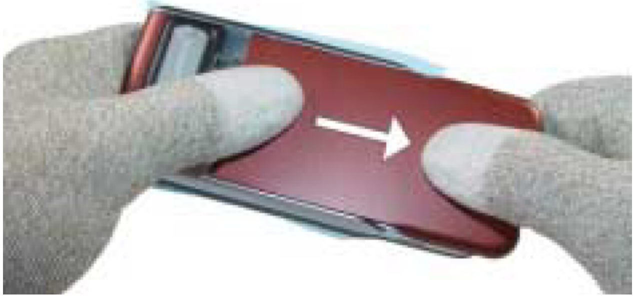
Disassembly instructions (see the video clips on care point also)

Steps

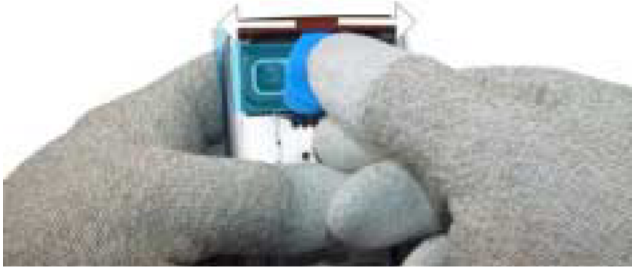
1. Protect the window with a film.



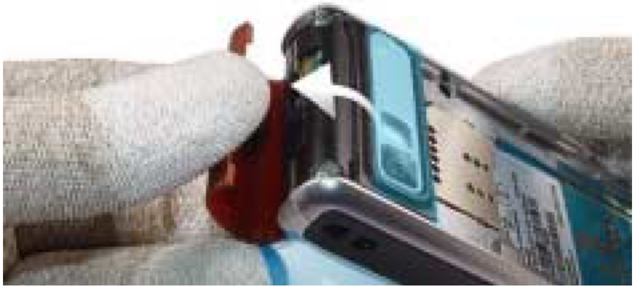
2. Open the Battery Cover and protect the Camera Window with a film.



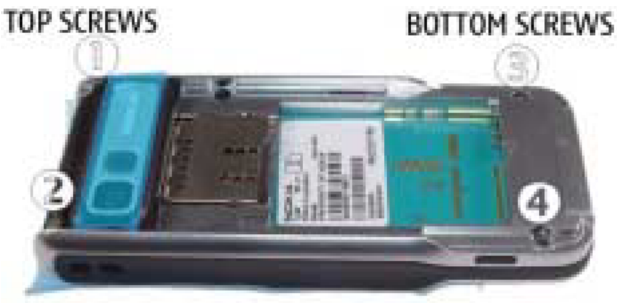
3. Place the SRT-6 between the edge of the Top Cover and the Camera Window. Move the SRT-6 to the left and to the right side to open the snaps of the Top Cover.



4. Remove the Top Cover.

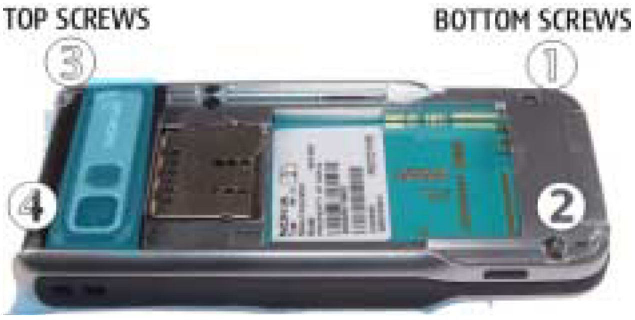


5. Unscrew and remove the Torx Plus size six screws in the shown order.

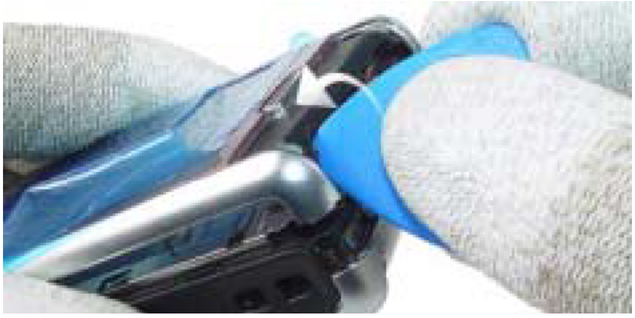

TOP SCREWS
BOTTOM SCREWS
1
2
3
4

6. **Note:** For assembly only!

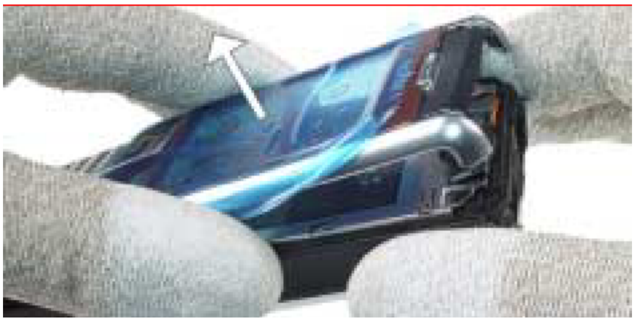
For assembly use the shown order and a torque of 5Ncm for the Top screws and a torque of 15Ncm for the Bottom screws!


TOP SCREWS
BOTTOM SCREWS
3
1
4
2

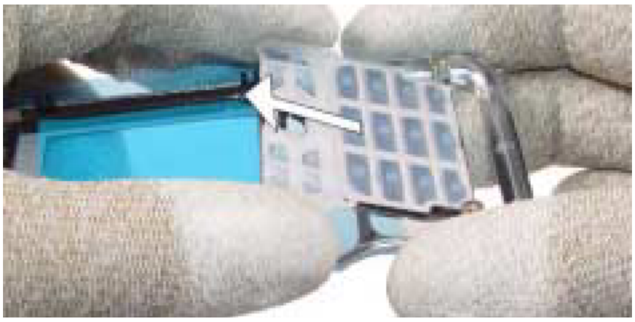
7. Use the SRT-6 to lift a bit the A-Cover.



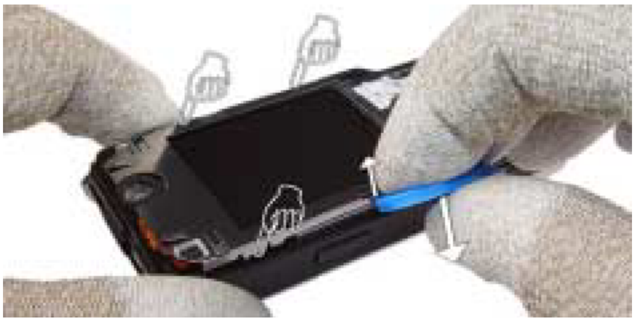
8. Remove the A-Cover.



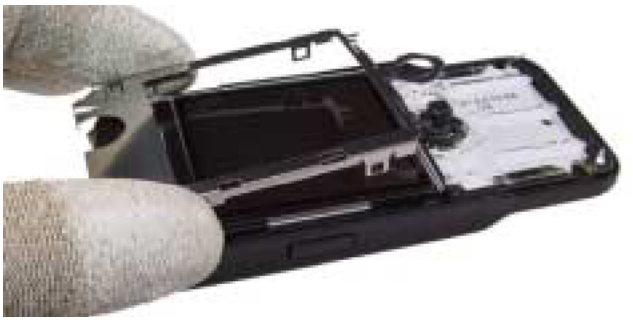
9. Remove the Keymat and protect the inner side of the window with a film.



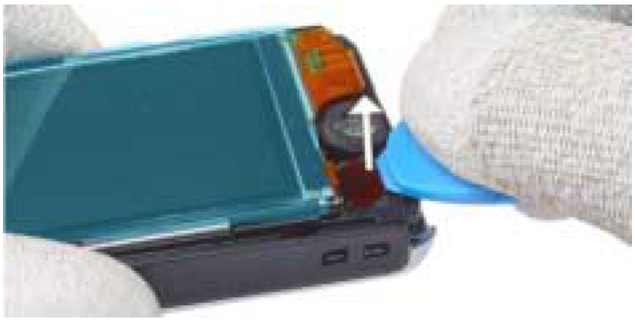
10. Use the SRT-6 to unlock the four clips of the Display Metal Frame.



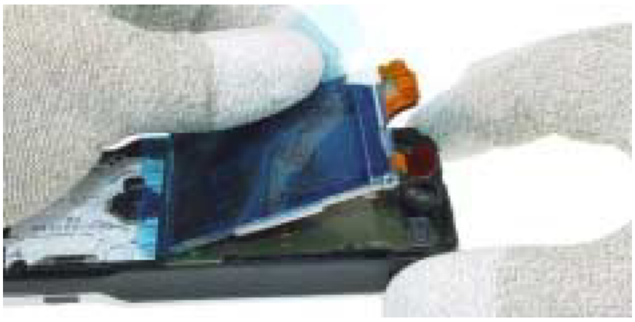
11. Remove the Display Metal Frame carefully.



12. Protect the Display with a film. Open the display connector carefully by using the SRT-6.

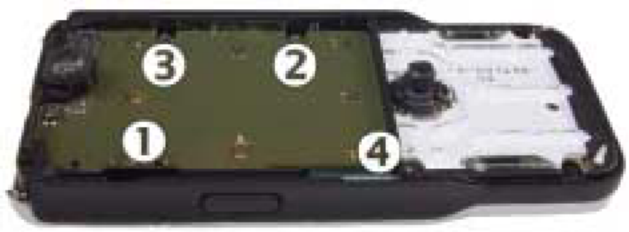


13. Remove the Display.

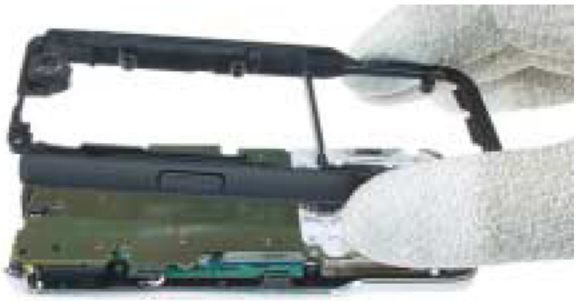


14. Unscrew and remove the four Torx Plus size six screws in the shown order.

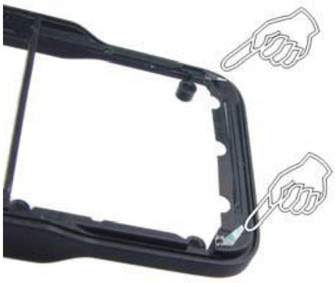
    Note: For assembly use the reverse order and a torque of 23Ncm.



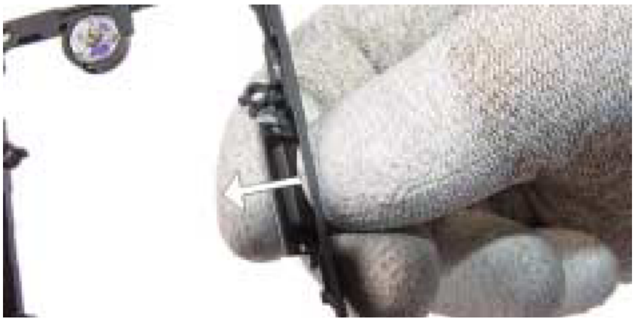
15. Remove the C Cover Assy.



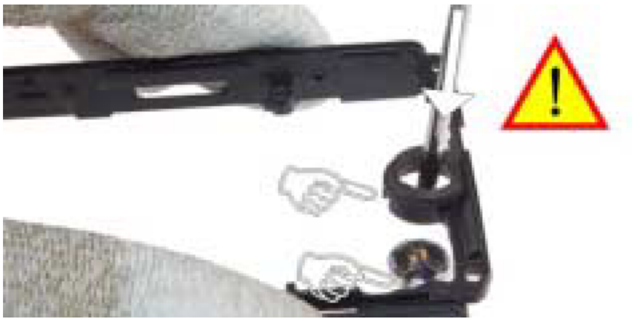
16. Take care of the Grounding Clips when re-assembling.



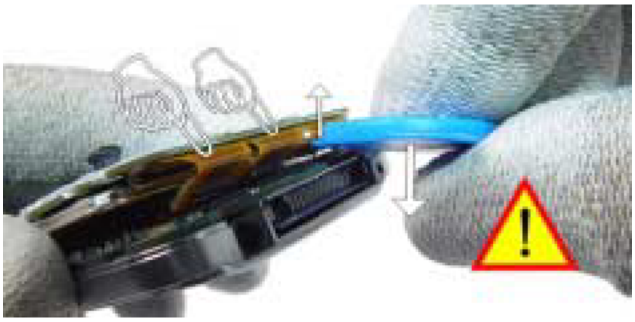
17. Remove the POC Key.



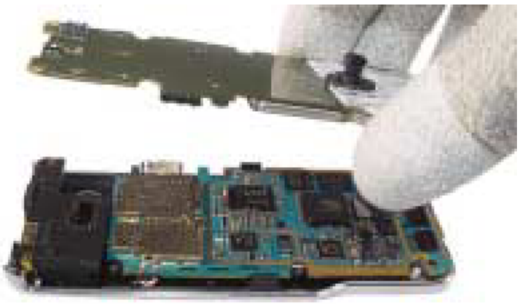
18. Earpiece can be removed by pushing it out from its guidance by using a Torx screwdriver. If it is necessary to replace the Earpiece always use a new Earpiece Adhesive. Note the guide pin when re-assembling.



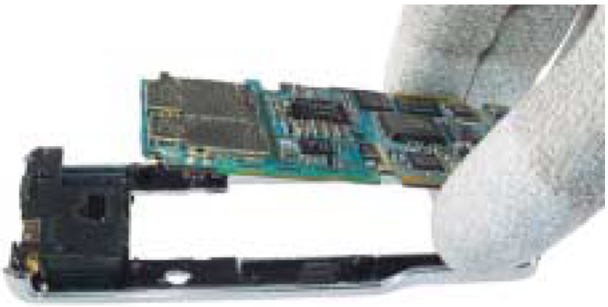
19. Use SRT-6 to disconnect the Flex Module carefully.



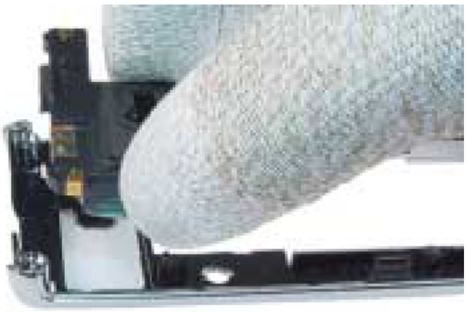
20. Remove the UI-Board Assy. Note: The UI-Board Assy and the Shield are only available as single spare parts. They do not to be glued in after sales.



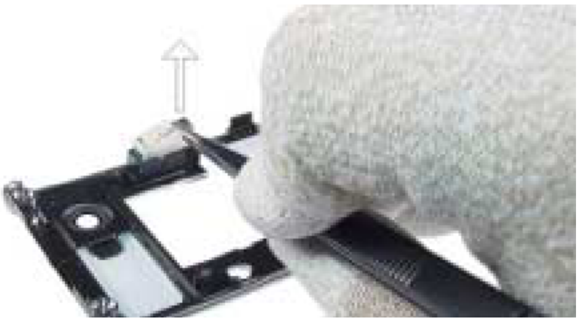
21. Remove the Engine Module.



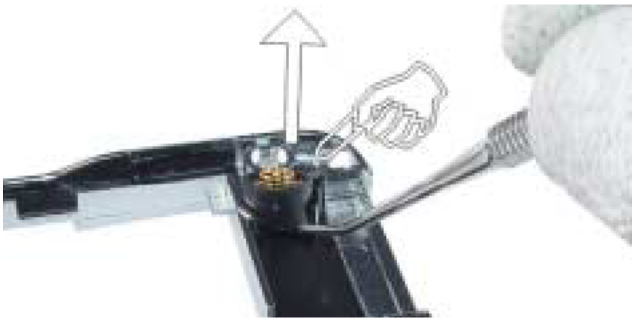
22. Remove the Antenna Assy..



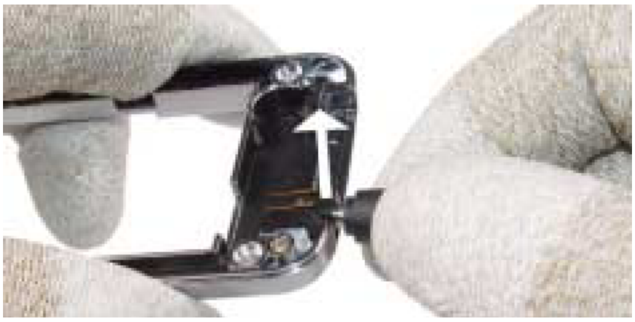
23. Use tweezers to remove the Vibra.



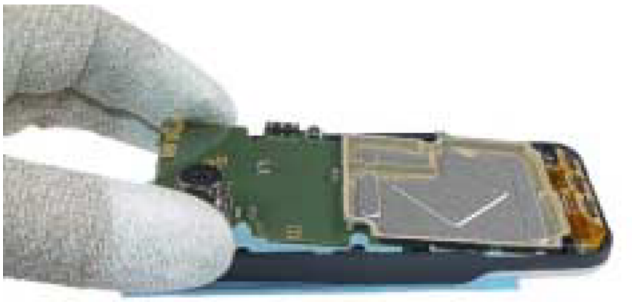
24. The dental tool can be used when removing the Microphone. Note the guiding when re-assembling.



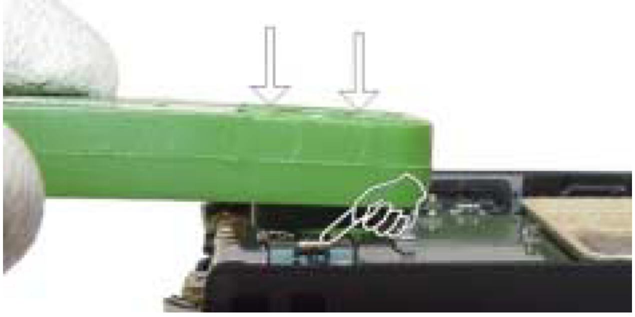
25. Now remove the DC-Jack by using the DC-plug.



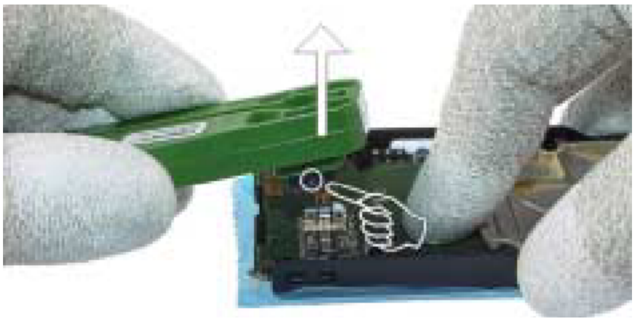
26. Use the A-Cover and the C-Cover as a support for the UI-Board when removing the Camera.



27. Release the clips of the camera holder by using the camera removal tool.



28. Remove the Camera and note the guide pin when re-assembling the device..



Reassembly instructions

For reassembly, follow the disassembly instructions, but in reversed order.

Note: Pay special attention to step 14 and 6.

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6 — Baseband troubleshooting

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Troubleshooting baseband

Context

This section is intended to be a guide for localising and repairing electrical faults.

The fault repairing is divided into troubleshooting paths. The following diagram describes the different baseband troubleshooting paths to be followed in fault situations.

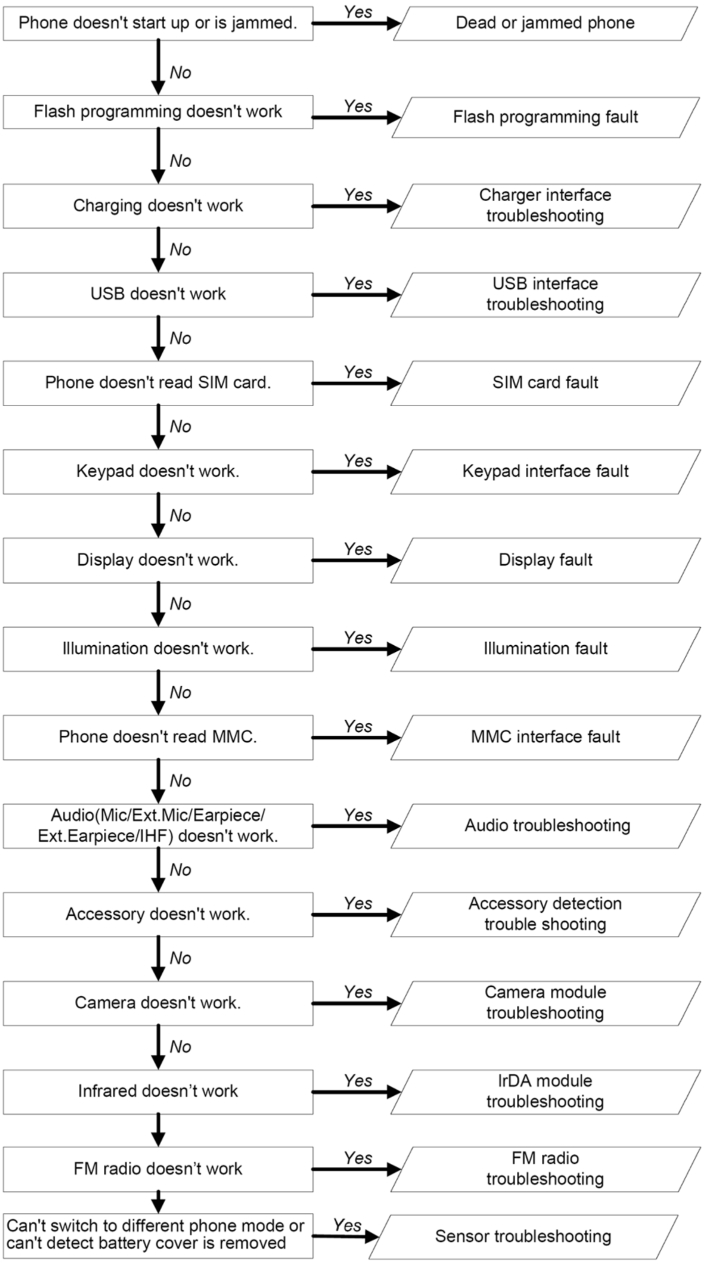

Phone doesn't start up or is jammed.
Yes
Dead or jammed phone
No
Flash programming doesn't work
Yes
Flash programming fault
No
Charging doesn't work
Yes
Charger interface troubleshooting
No
USB doesn't work
Yes
USB interface troubleshooting
No
Phone doesn't read SIM card.
Yes
SIM card fault
No
Keypad doesn't work.
Yes
Keypad interface fault
No
Display doesn't work.
Yes
Display fault
No
Illumination doesn't work.
Yes
Illumination fault
No
Phone doesn't read MMC.
Yes
MMC interface fault
No
Audio(Mic/Ext.Mic/Earpiece/ Ext.Earpiece/IHF) doesn't work.
Yes
Audio troubleshooting
No
Accessory doesn't work.
Yes
Accessory detection trouble shooting
No
Camera doesn't work.
Yes
Camera module troubleshooting
No
Infrared doesn't work
Yes
IrDA module troubleshooting
FM radio doesn't work
Yes
FM radio troubleshooting
Can't switch to different phone mode or can't detect battery cover is removed
Yes
Sensor troubleshooting

Figure 82 Main troubleshooting diagram

Troubleshooting dead or jammed phone

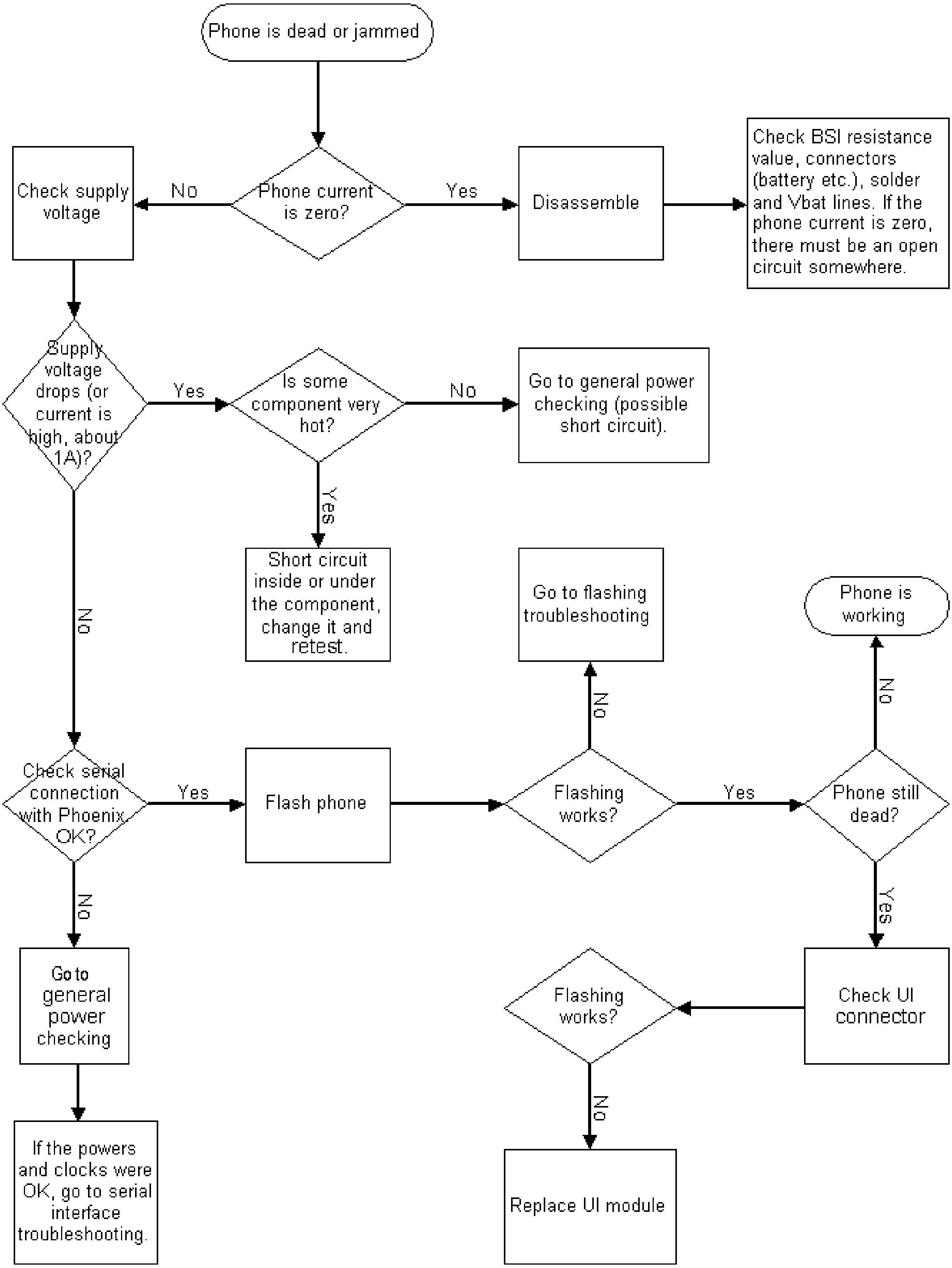

Phone is dead or jammed
Phone current is zero?
No
Yes
Check supply voltage
Disassemble
Check BSI resistance value, connectors (battery etc.), solder and Vbat lines. If the phone current is zero, there must be an open circuit somewhere.
Supply voltage drops (or current is high, about 1A)?
Yes
Is some component very hot?
No
Go to general power checking (possible short circuit).
Yes
Short circuit inside or under the component, change it and retest.
No
Go to flashing troubleshooting
Phone is working
No
No
Check serial connection with Phoenix OK?
Yes
Flash phone
Flashing works?
Yes
Phone still dead?
No
Yes
Go to general power checking
Flashing works?
Check UI connector
No
If the powers and clocks were OK, go to serial interface troubleshooting.
Replace UI module

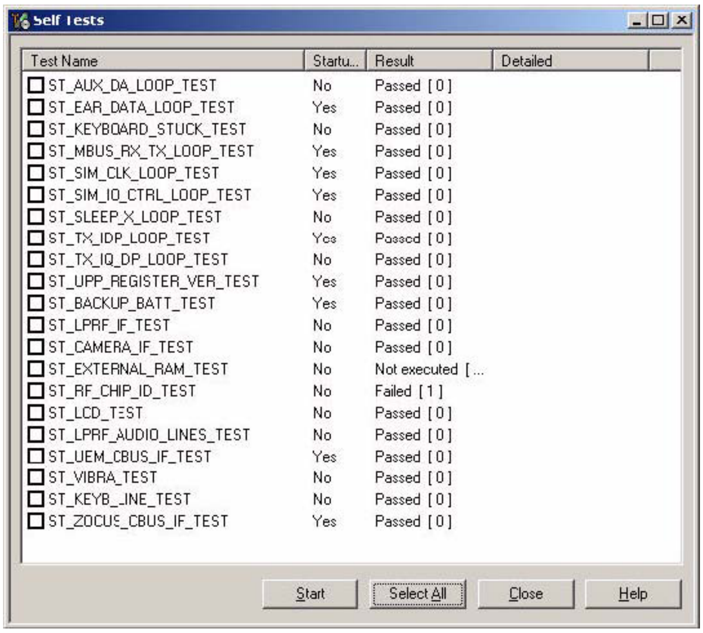
Figure 83 Dead or jammed phone troubleshooting

BB self test tools

Self test functions are executed when the phone is powered on, and if one or more self test functions fail, the message “Self test failed. Contact Service.” is displayed. However, in this kind of situation the software is able to run and thus the watchdog of UEME can be served.

The MCU selftest case can be split into two categories: the ones that are executed during power up and the ones that are executed only with a PC connected.

These tests and the items included are as follows:



Test Name	Startu...	Result	Detailed
☐ ST_AUX_DA_LOOP_TEST	No	Passed [0]	
☐ ST_EAR_DATA_LOOP_TEST	Yes	Passed [0]	
☐ ST_KEYBOARD_STUCK_TEST	No	Passed [0]	
☐ ST_MBUS_RX_TX_LOOP_TEST	Yes	Passed [0]	
☐ ST_SIM_CLK_LOOP_TEST	Yes	Passed [0]	
☐ ST_SIM_IO_CTRL_LOOP_TEST	Yes	Passed [0]	
☐ ST_SLEEP_X_LOOP_TEST	No	Passed [0]	
☐ ST_TX_IDP_LOOP_TEST	Yes	Passed [0]	
☐ ST_TX_IQ_DP_LOOP_TEST	No	Passed [0]	
☐ ST_UPP_REGISTER_VER_TEST	Yes	Passed [0]	
☐ ST_BACKUP_BATT_TEST	Yes	Passed [0]	
☐ ST_LPRF_IF_TEST	No	Passed [0]	
☐ ST_CAMERA_IF_TEST	No	Passed [0]	
☐ ST_EXTERNAL_RAM_TEST	No	Not executed [...	
☐ ST_RF_CHIP_ID_TEST	No	Failed [1]	
☐ ST_LCD_TEST	No	Passed [0]	
☐ ST_LPRF_AUDIO_LINES_TEST	No	Passed [0]	
☐ ST_UEM_CBUS_IF_TEST	Yes	Passed [0]	
☐ ST_VIBRA_TEST	No	Passed [0]	
☐ ST_KEYB_LINE_TEST	No	Passed [0]	
☐ ST_ZOCUS_CBUS_IF_TEST	Yes	Passed [0]	

Figure 84 BB self tests

Troubleshooting flash programming

Context

Note: The Phoenix error message *C101 Boot timeout* in the flowchart refers to a message that is shown when there are problems in the phone flash programming when using FPS-8.

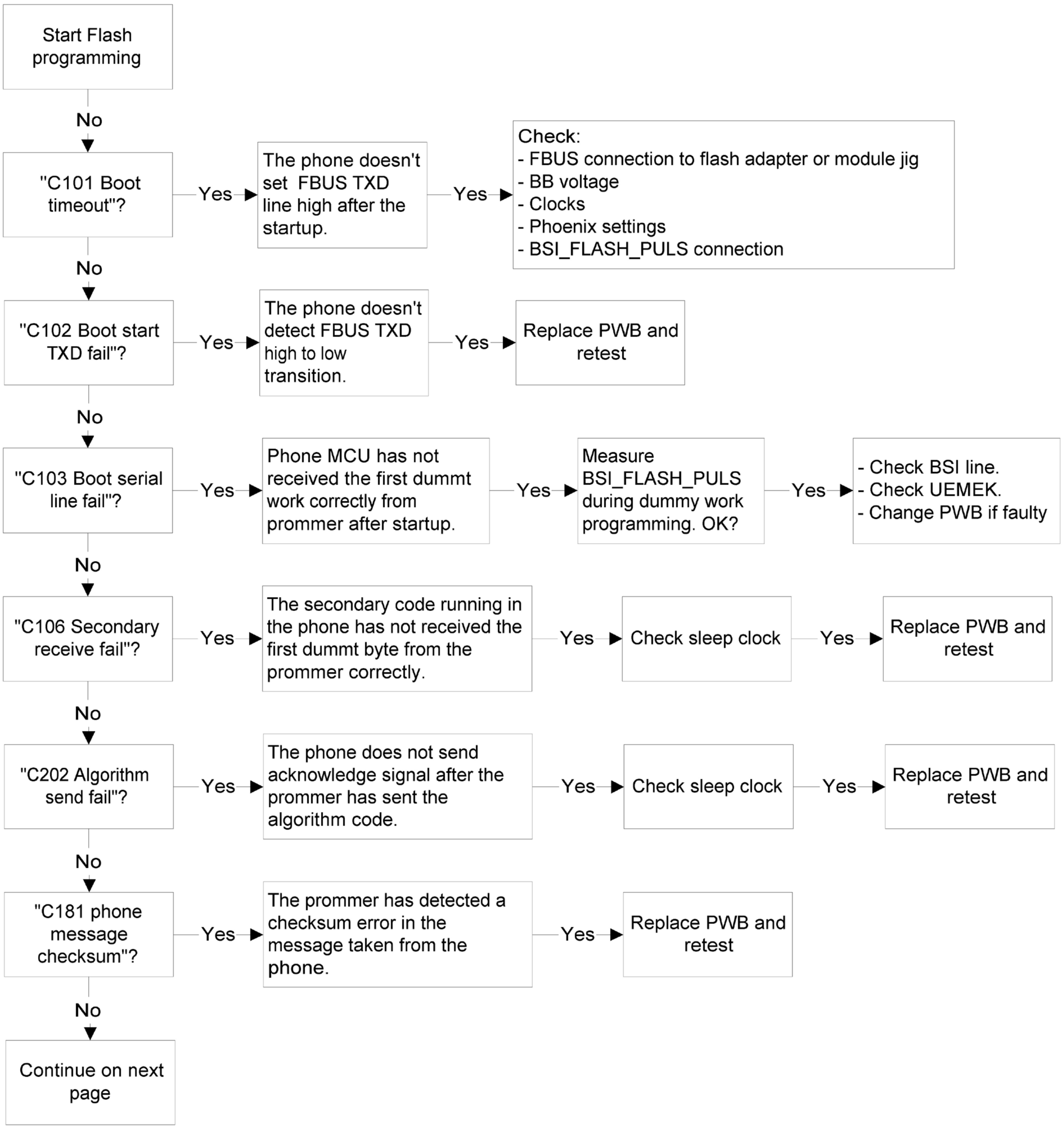

Start Flash programming
No
"C101 Boot timeout"?
Yes
The phone doesn't set FBUS TXD line high after the startup.
Yes
Check:
- FBUS connection to flash adapter or module jig
- BB voltage
- Clocks
- Phoenix settings
- BSI_FLASH_PULS connection
No
"C102 Boot start TXD fail"?
Yes
The phone doesn't detect FBUS TXD high to low transition.
Yes
Replace PWB and retest
No
"C103 Boot serial line fail"?
Yes
Phone MCU has not received the first dummt work correctly from prommer after startup.
Yes
Measure BSI_FLASH_PULS during dummy work programming. OK?
Yes
- Check BSI line.
- Check UEMEK.
- Change PWB if faulty
No
"C106 Secondary receive fail"?
Yes
The secondary code running in the phone has not received the first dummt byte from the prommer correctly.
Yes
Check sleep clock
Yes
Replace PWB and retest
No
"C202 Algorithm send fail"?
Yes
The phone does not send acknowledge signal after the prommer has sent the algorithm code.
Yes
Check sleep clock
Yes
Replace PWB and retest
No
"C181 phone message checksum"?
Yes
The prommer has detected a checksum error in the message taken from the phone.
Yes
Replace PWB and retest
No
Continue on next page

Figure 85 Flash programming troubleshooting, part 1

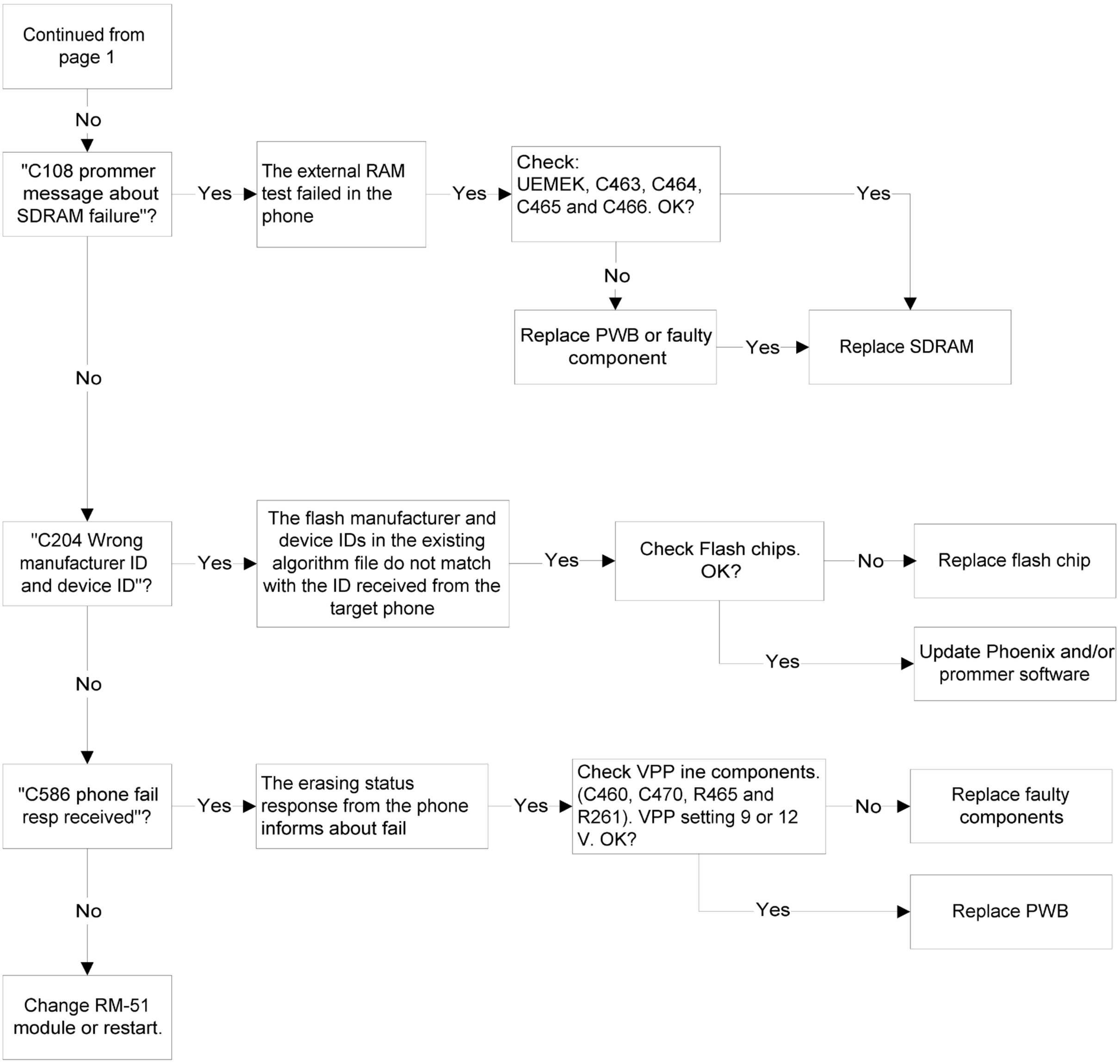

Continued from page 1
No
"C108 prommer message about SDRAM failure"?
Yes
The external RAM test failed in the phone
Yes
Check: UEMEK, C463, C464, C465 and C466. OK?
Yes
No
Replace PWB or faulty component
Yes
Replace SDRAM
No
"C204 Wrong manufacturer ID and device ID"?
Yes
The flash manufacturer and device IDs in the existing algorithm file do not match with the ID received from the target phone
Yes
Check Flash chips. OK?
No
Replace flash chip
Yes
Update Phoenix and/or prommer software
No
"C586 phone fail resp received"?
Yes
The erasing status response from the phone informs about fail
Yes
Check VPP ine components. (C460, C470, R465 and R261). VPP setting 9 or 12 V. OK?
No
Replace faulty components
Yes
Replace PWB
No
Change RM-51 module or restart.

Figure 86 Flash programming troubleshooting, part 2

General power troubleshooting

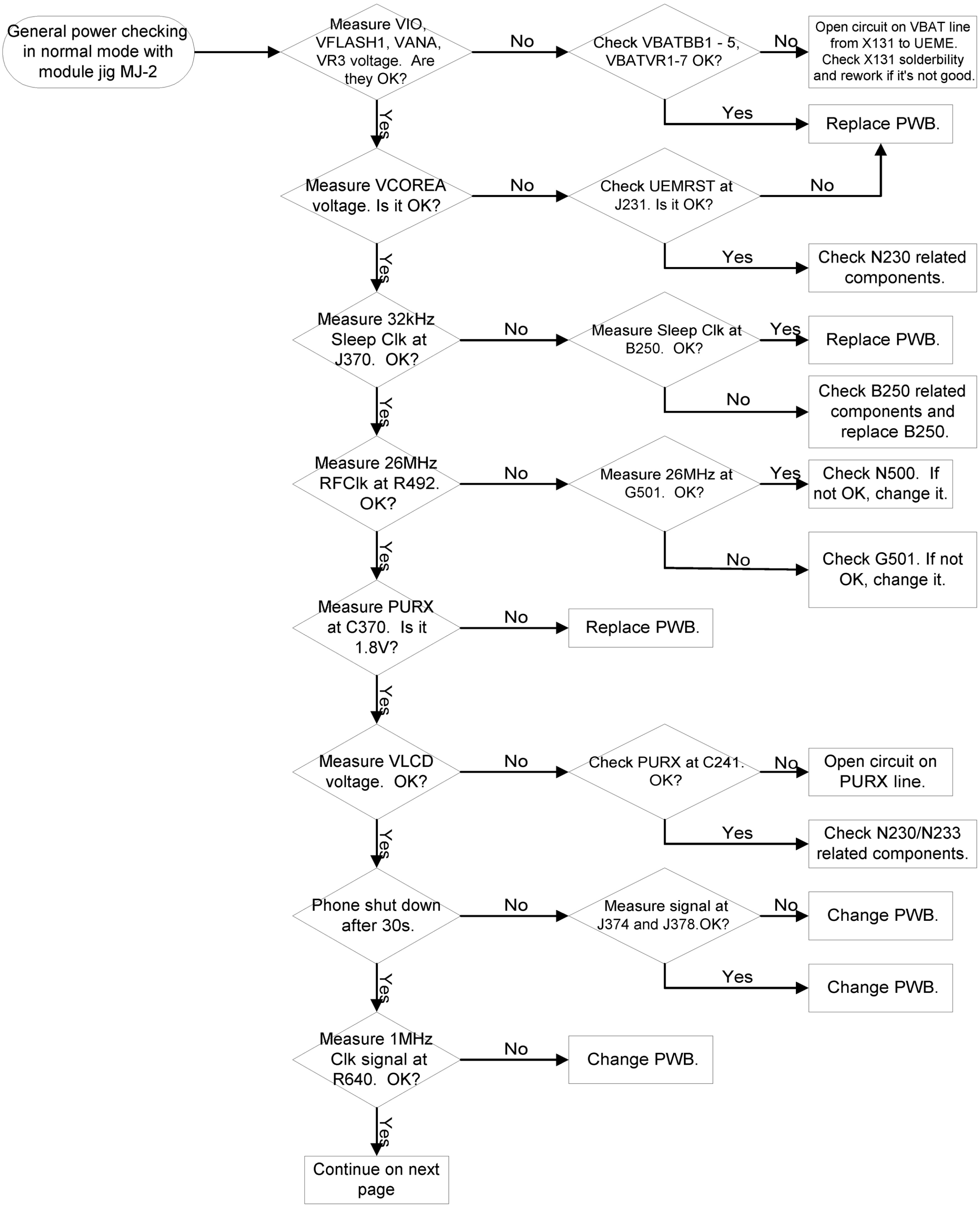

General power checking in normal mode with module jig MJ-2
Measure VIO, VFLASH1, VANA, VR3 voltage. Are they OK?
No
Check VBATBB1 - 5, VBATVR1-7 OK?
No
Open circuit on VBAT line from X131 to UEME. Check X131 solderbility and rework if it's not good.
Yes
Replace PWB.
Yes
Measure VCOREA voltage. Is it OK?
No
Check UEMRST at J231. Is it OK?
No
Yes
Check N230 related components.
Yes
Measure 32kHz Sleep Clk at J370. OK?
No
Measure Sleep Clk at B250. OK?
Yes
Replace PWB.
No
Check B250 related components and replace B250.
Yes
Measure 26MHz RFClk at R492. OK?
No
Measure 26MHz at G501. OK?
Yes
Check N500. If not OK, change it.
No
Check G501. If not OK, change it.
Yes
Measure PURX at C370. Is it 1.8V?
No
Replace PWB.
Yes
Measure VLCD voltage. OK?
No
Check PURX at C241. OK?
No
Open circuit on PURX line.
Yes
Check N230/N233 related components.
Yes
Phone shut down after 30s.
No
Measure signal at J374 and J378.OK?
No
Change PWB.
Yes
Change PWB.
Yes
Measure 1MHz Clk signal at R640. OK?
No
Change PWB.
Yes
Continue on next page

Figure 87 General power troubleshooting, part 1

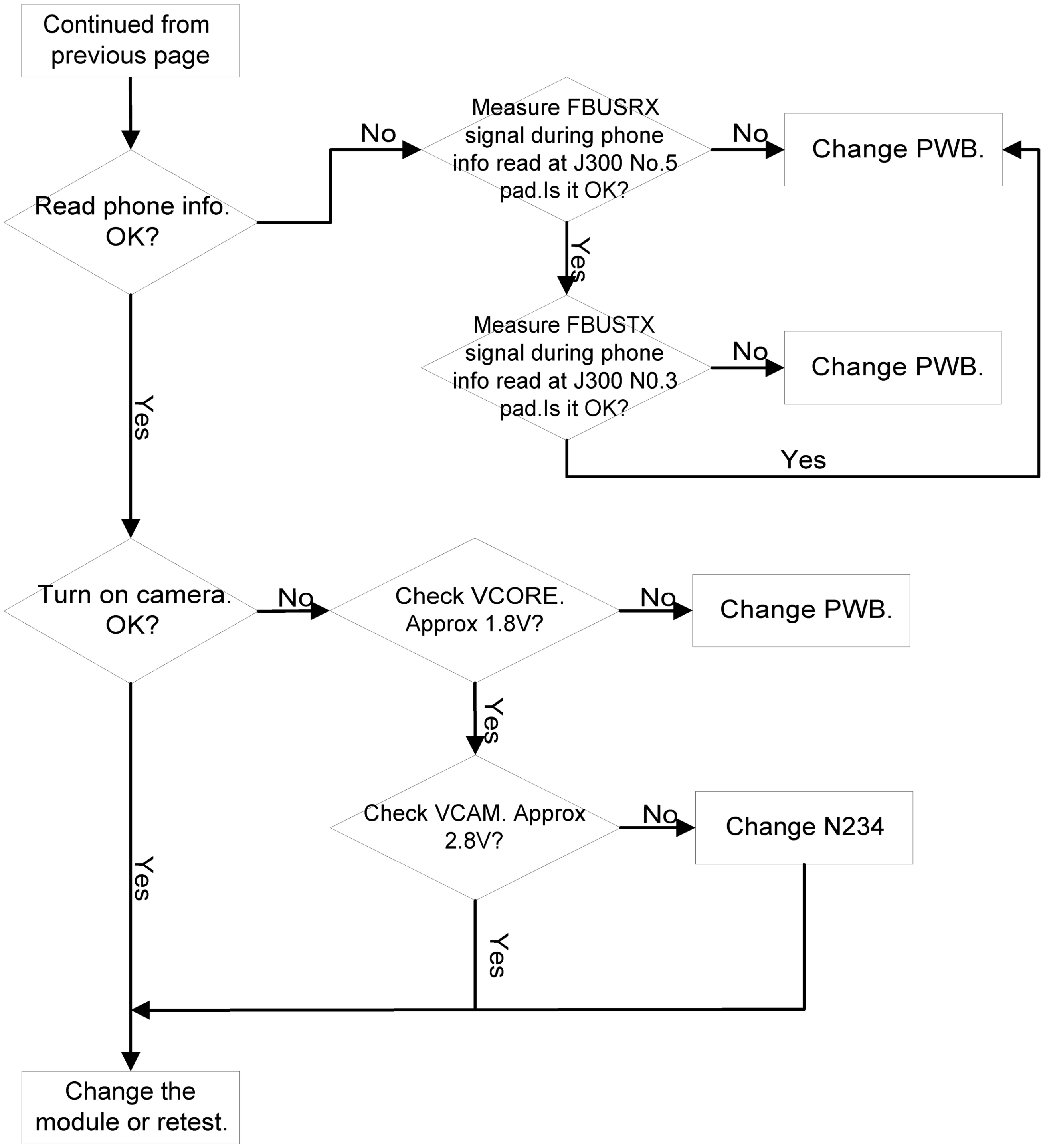

Continued from previous page
Read phone info. OK?
No
Measure FBUSRX signal during phone info read at J300 No.5 pad.Is it OK?
No
Change PWB.
Yes
Measure FBUSTX signal during phone info read at J300 N0.3 pad.Is it OK?
No
Change PWB.
Yes
Yes
Turn on camera. OK?
No
Check VCORE. Approx 1.8V?
No
Change PWB.
Yes
Check VCAM. Approx 2.8V?
No
Change N234
Yes
Yes
Change the module or retest.

Figure 88 General power troubleshooting, part 2

Baseband serial interface troubleshooting

CBUS interface

CBUS is a three-wire serial interface between the main baseband components.

The bus consists of data, clock and bus_enable signals. The bus is connected between UPP_WD2, UEMEK and ZOCUS. UPP_WD2 takes care of controlling the traffic on the bus.

If the interface is faulty from the UPP_WD2’s end, the phone does not boot properly as powering configurations do not work.

Traffic on the bus can be monitored at the following test point and pins.

- R640 (test point J193 side)
- CBusEN1X J378 Pad
- CBusDA J377 Pad

The pads and pins are shown in the figures below.

CBUS test points

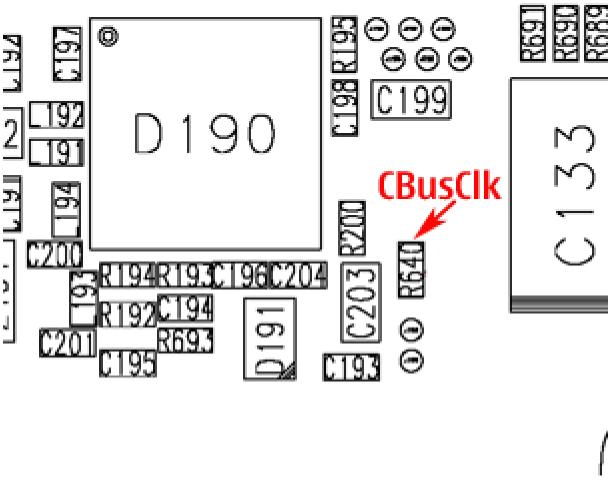

C197
C192
C191
C194
C200
D190
R195
C198
C199
R691
R690
R689
CBusClk
C133
R200
R640
R194
R193
C196
C204
C193
R192
C194
C201
R693
C195
D191
C203
C193

Figure 89 CBusClk test point

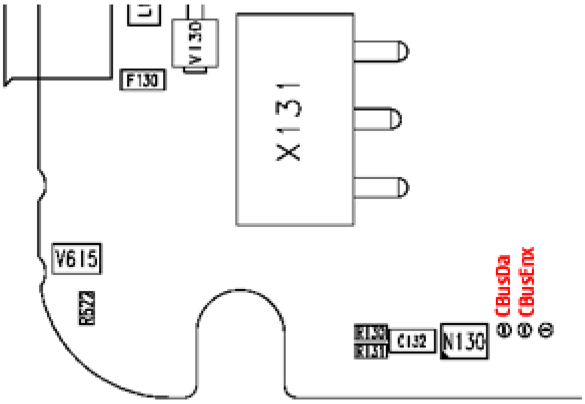

V130
F130
X131
V615
R522
R130
R131
C132
N130
CBusDa
CBusEnx

Figure 90 CBUS test points

The CBUS traffic is shown in the following figure (read command to ZOCUS, LM3820, N130).

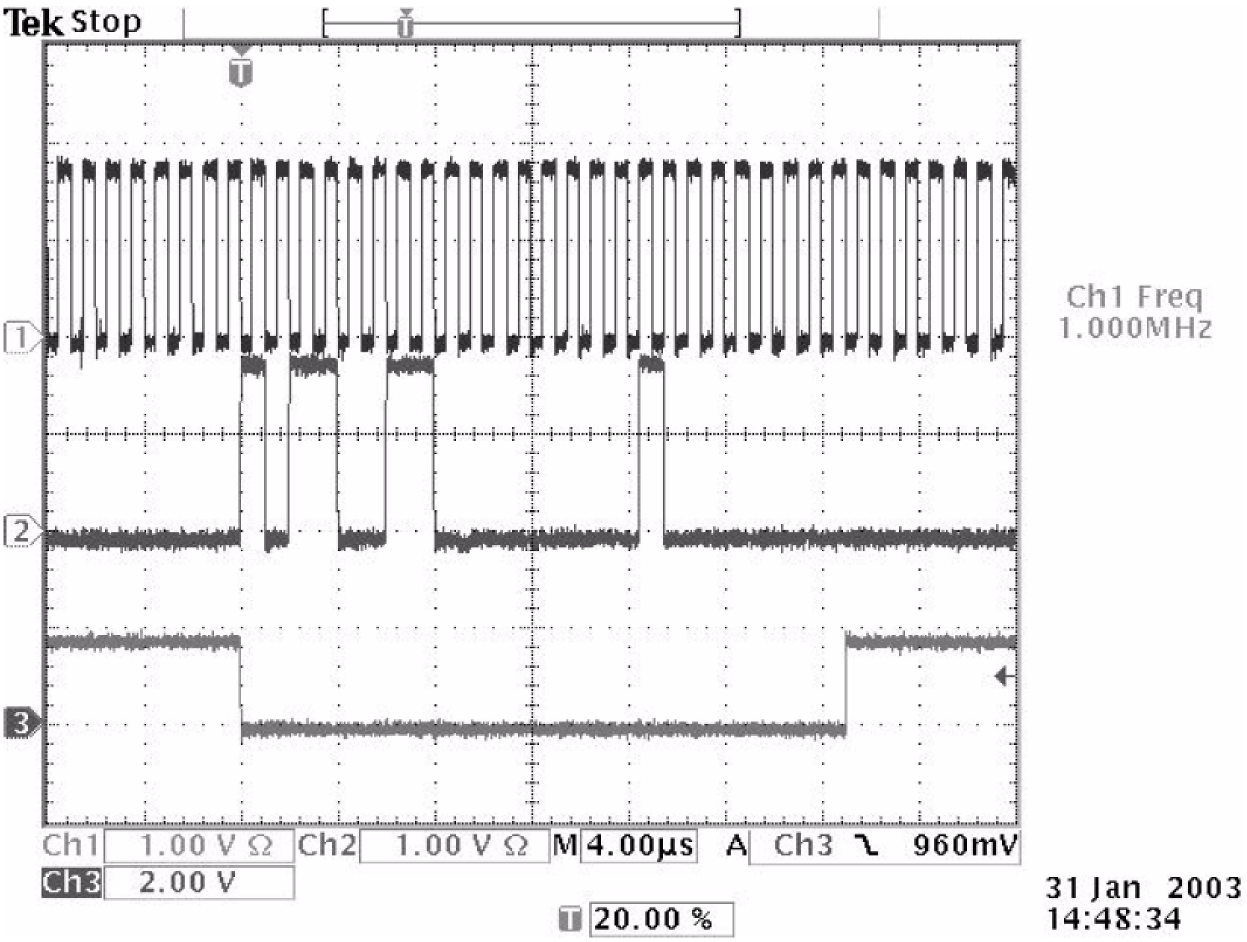


Figure 91 CBUS waveform

CBusCLk is connected to Ch1, CBusDa to CH2 and CBusEnx to Ch3.

If you are able to get the phone to boot up and can reach Phoenix BB self test feature, it is possible to test the functionality of each component attached to CBus. Use:

- ST_UEM_CBUS_IF_TEST to test the UEMEK CBus interface
- ST_ZOCUS_CBUS_IF_TEST to test the ZOCUS CBus interface.

If an error is found in testing any of the above components, you should replace or re-solder the failed component.

FBUS interface

FBUS is a two-wire Rx and Tx interface between UPP_WD2 and flash/test interface. The bus goes through UEMEK, which adjusts the voltage levels to suit UPP_WD2.

The interface voltage level on the phone flash/test pad pattern is 2.78V and on the UPP_WD2 end it is 1.8V.

The functionality of this interface should not affect the device boot into NORMAL, LOCAL or TEST modes.

Phoenix tests can be performed through the MBUS interface in the case of a failure in the FBUS interface. Flashing is not possible if there is a problem in the FBUS interface. FBUS signals located in the flashing test pads and the pad layout is shown in the figure below.

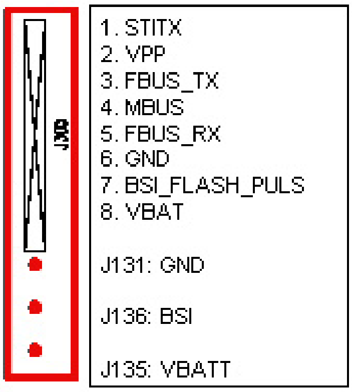

1. STITX
2. VPP
3. FBUS_TX
4. MBUS
5. FBUS_RX
6. GND
7. BSI_FLASH_PULS
8. VBAT
J131: GND
J136: BSI
J135: VBATT

Figure 92 Flash interface layout (FBUS/MBUS test pads layout)

MBUS interface

MBUS is a two-wire RX and TX interface between UPP_WD2 and UEMEK. From UEMEK the interface continues to flash/test interface as one-wire interface. UEMEK adjusts the voltage levels.

The interface voltage level on the phone flash/test pad pattern is 2.78V and on the UPP_WD2 end it is 1.8V.

MBUS traffic between UPP_WD2 and UEMEK can be tested with Phoenix (**ST_MBUS_RX_TX_LOOP_TEST**).

Flashing is not possible if there is a problem in MBUS. For the location of the MBUS signal in the test pads and the pad layout, see figure .

Troubleshooting charger interface

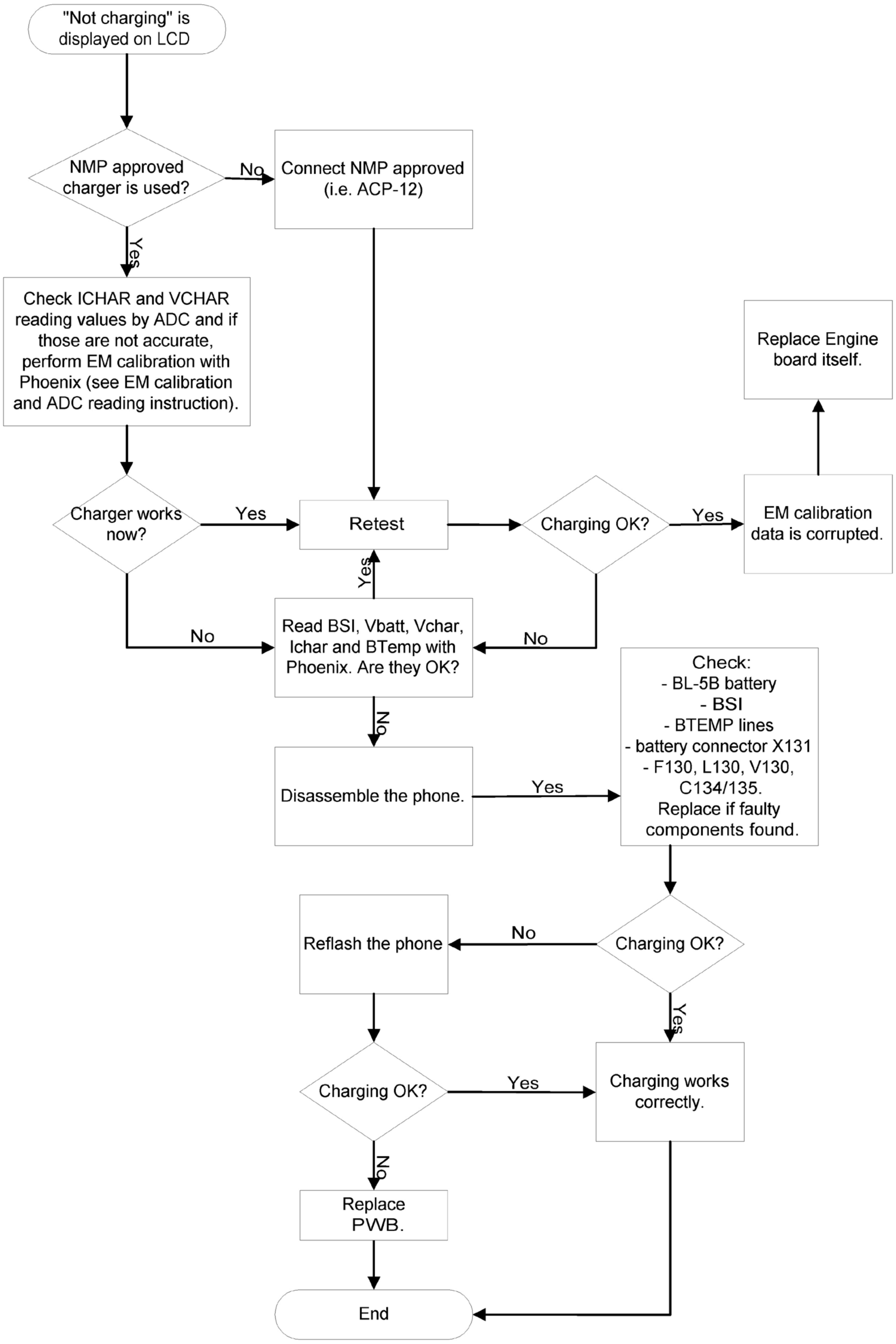

"Not charging" is displayed on LCD
NMP approved charger is used?
No
Connect NMP approved (i.e. ACP-12)
Yes
Check ICHAR and VCHAR reading values by ADC and if those are not accurate, perform EM calibration with Phoenix (see EM calibration and ADC reading instruction).
Replace Engine board itself.
Charger works now?
Yes
Retest
Charging OK?
Yes
EM calibration data is corrupted.
Yes
No
Read BSI, Vbatt, Vchar, Ichar and BTemp with Phoenix. Are they OK?
No
Check:
- BL-5B battery
- BSI
- BTEMP lines
- battery connector X131
- F130, L130, V130, C134/135.
Replace if faulty components found.
No
Disassemble the phone.
Yes
Reflash the phone
No
Charging OK?
Yes
Charging OK?
Yes
Charging works correctly.
No
Replace PWB.
End

Figure 93 "Not charging" on display

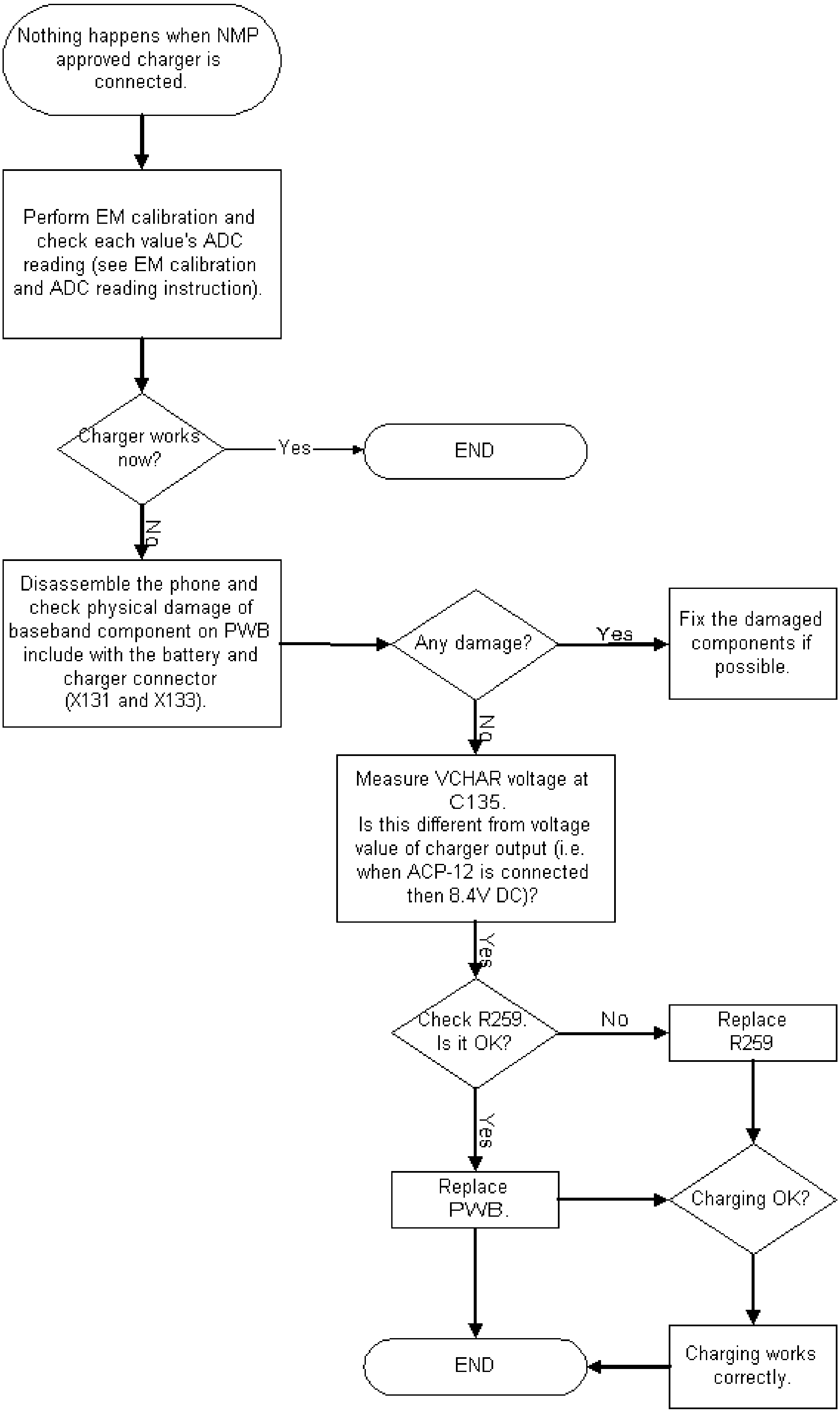

Nothing happens when NMP approved charger is connected.
Perform EM calibration and check each value's ADC reading (see EM calibration and ADC reading instruction).
Charger works now?
Yes
END
No
Disassemble the phone and check physical damage of baseband component on PWB include with the battery and charger connector (X131 and X133).
Any damage?
Yes
Fix the damaged components if possible.
No
Measure VCHAR voltage at C135. Is this different from voltage value of charger output (i.e. when ACP-12 is connected then 8.4V DC)?
Yes
Check R259. Is it OK?
No
Replace R259
Yes
Replace PWB.
Charging OK?
Charging works correctly.
END

Figure 94 No charging

Energy management calibration

EM calibrations should be carried out with a JBV-1 docking station attached to a DA-44 docking station adapter.

Power to JBV-1 should be supplied from an external DC power supply. JBV-1 input voltages: nominal + 12 VDC, maximum +16VDC.

On the JBV-1, A/D converter, BSI, BTEMP, battery voltage (VBAT), charger voltage (VCHAR), charger current (ICHAR) and battery current (IBAT) are calibrated.

Baseband troubleshooting tips

ADC-offset over limits

Inspect the BSI line and its components. Note that the BSI resistance line of the battery is connected to the AD input of the UEMEK labelled LS (not the BSI input). If these are OK, change PWB.

BSI gain over limits

Inspect the BSI line and its components. Note that the BSI resistance line of the battery is connected to the AD input of the UEMEK labelled LS (not the BSI input). If these are OK, change PWB.

VBAT offset and gain

Inspect VBAT lines and its components.

VCHAR over limits

Inspect components that are connected to VCHAR line: filtering capacitors C134, C135, TVS V130, L130 and fuse F130. If those are OK, change PWB.

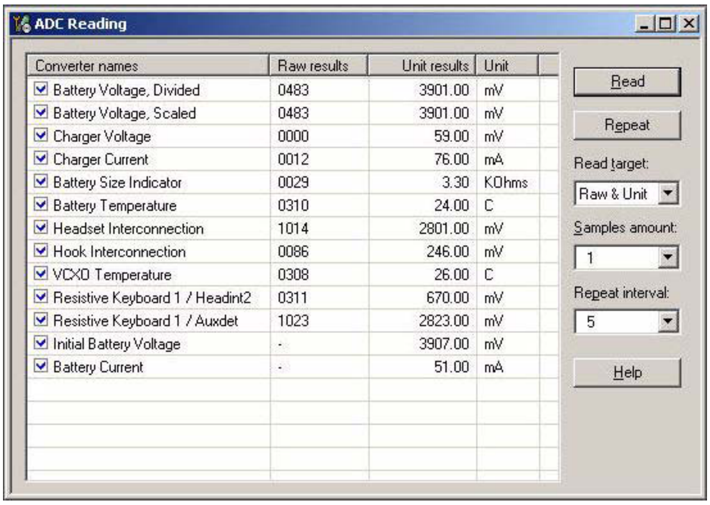
ICHAR over limits

Inspect components that are connected to VCHAR line: filtering capacitors C134, C135, TVS V130, L130 and fuse F130. If those are OK, change the current sense resistor R259 first. If calibration is still not successful, change PWB.

Calibration can be checked using the ADC reading. Known voltages, currents and resistances are fed to and read by the ADC reading. The read values can then be compared with the known values.

ADC reading

Divided and scaled battery voltage, battery current, charger voltage, charger current and BSI values can be read by this tool. Read values a few times until you can be sure that results are accurate.



Converter names	Raw results	Unit results	Unit
☑ Battery Voltage, Divided	0483	3901.00	mV
☑ Battery Voltage, Scaled	0483	3901.00	mV
☑ Charger Voltage	0000	59.00	mV
☑ Charger Current	0012	76.00	mA
☑ Battery Size Indicator	0029	3.30	KOhms
☑ Battery Temperature	0310	24.00	C
☑ Headset Interconnection	1014	2801.00	mV
☑ Hook Interconnection	0086	246.00	mV
☑ VCXO Temperature	0308	26.00	C
☑ Resistive Keyboard 1 / Headint2	0311	670.00	mV
☑ Resistive Keyboard 1 / Auxdet	1023	2823.00	mV
☑ Initial Battery Voltage	-	3907.00	mV
☑ Battery Current	-	51.00	mA

Read target: Raw & Unit

Samples amount: 1

Repeat interval: 5

Figure 95 ADC reading window in Phoenix

Table 4 Maximum tolerances

Reading	Check point	Tolerance
VBAT SCAL	4.2V	±25mV
VCHAR	8.4V	±40mV
ICHAR	500mA	±20mV
BSI	75k (BL-5B)	±1.3kohm
Btemp	273K (47k)	+5K

Backup battery troubleshooting

A symptom of a backup battery fault is that Real Time Clock loses the correct time during short battery removal. The same symptom can also be seen when the backup battery is empty. About 30 minutes is needed to fully charge the backup battery in the device.

> **Note:** The backup battery is only charged at the same time as the main battery or when the device is in the LOCAL or TEST mode.

Always check the backup battery visually for any leakage or any other visual defect.

Check that the backup battery is correctly mounted in the device before closing the cover.

Check with Phoenix that the backup battery is OK.

Measure the voltage of the backup battery.

- Normal operation when the voltage is > 2.0V.
- Fully charged when the voltage is about 3.2V.

Enable the backup battery charging (start to charge the main battery or boot the device to LOCAL or TEST mode).

Measure the voltage of the backup battery during charging, it should rise if it is not 3.2V yet.

When the voltage is over 2.0V for certain, check the backup battery with Phoenix.

Troubleshooting USB interface

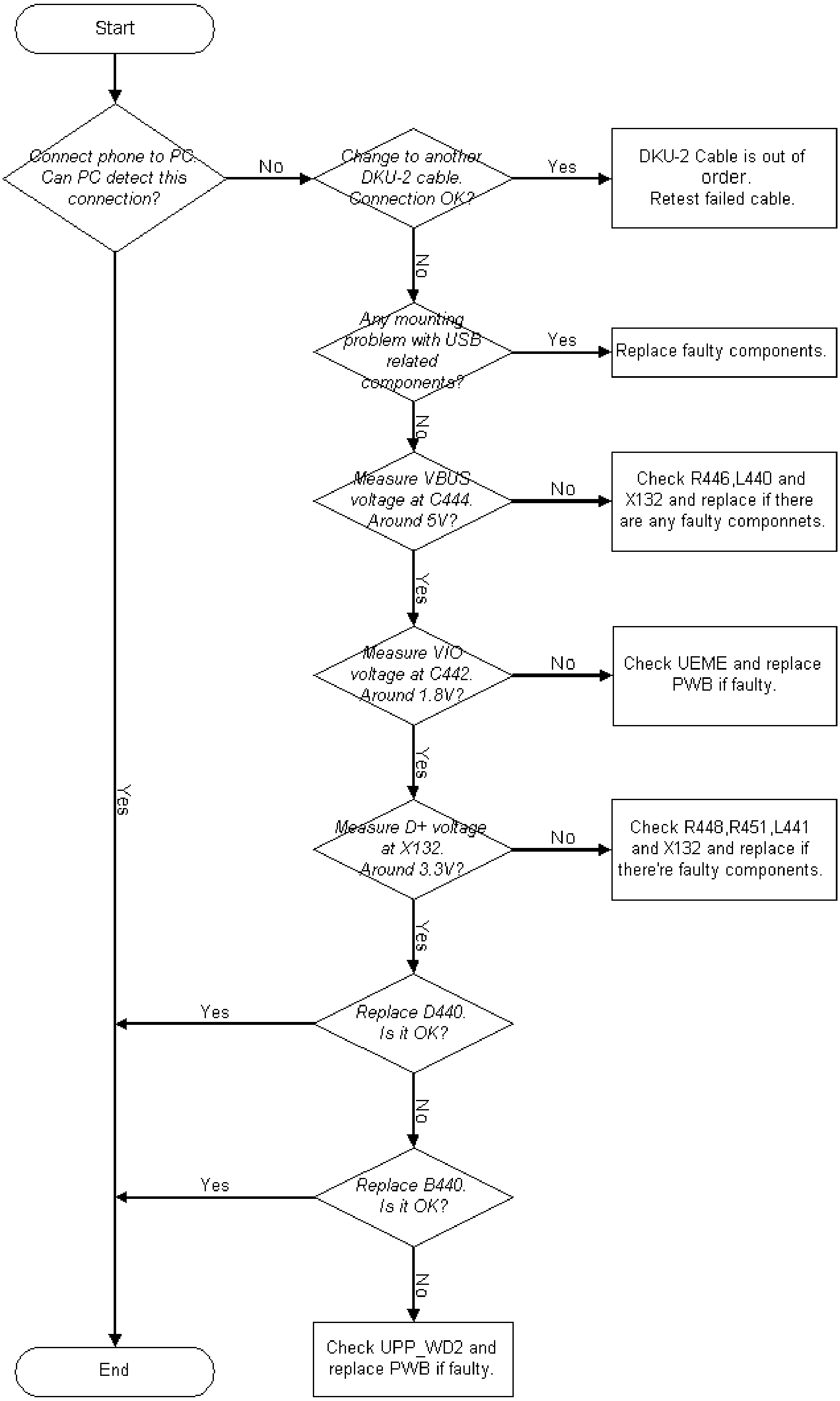

Start
Connect phone to PC. Can PC detect this connection?
No
Change to another DKU-2 cable. Connection OK?
Yes
DKU-2 Cable is out of order. Retest failed cable.
No
Any mounting problem with USB related components?
Yes
Replace faulty components.
No
Measure VBUS voltage at C444. Around 5V?
No
Check R446,L440 and X132 and replace if there are any faulty componnets.
Yes
Measure VIO voltage at C442. Around 1.8V?
No
Check UEME and replace PWB if faulty.
Yes
Measure D+ voltage at X132. Around 3.3V?
No
Check R448,R451,L441 and X132 and replace if there're faulty components.
Yes
Replace D440. Is it OK?
Yes
No
Replace B440. Is it OK?
Yes
No
Check UPP_WD2 and replace PWB if faulty.
Yes
End

Figure 96 USB interface troubleshooting

SIM card fault

The whole SIM interface is located in two chips: UPP_WD2 and UEMEK. UEMEK contains the SIM interface logic level shifting. UPP_WD2 provides SIMClk through UEMEK to the SIM. The SIM interface supports both 3V and 1.8V SIMs. There is an EMIF component (3 lines EMI filter) between the SIM card and the UEMEK which isn't shown in the figure below.

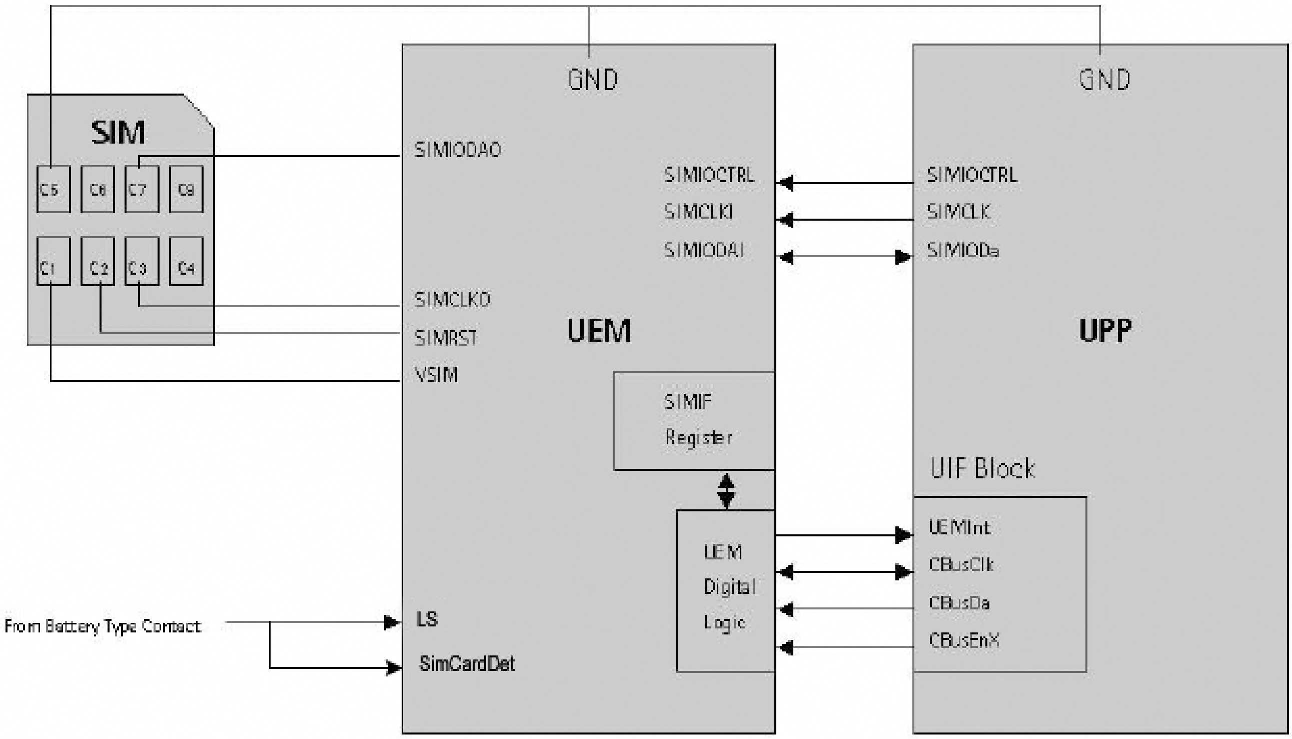

SIM
C5
C6
C7
C8
C1
C2
C3
C4
GND
SIMIODAO
SIMIOCTRL
SIMCLKI
SIMIODAI
SIMCLKO
SIMRST
VSIM
UEM
SIMIF
Register
UEM
Digital
Logic
From Battery Type Contact
LS
SimCardDet
GND
SIMIOCTRL
SIMCLK
SIMIODa
UPP
UIF Block
UEMInt
CBusClk
CBusDa
CBusEnX

Figure 97 UPP_WD2 and UEMEK SIM connections (simplified)

The SIM power up/down sequence is generated in the UEMEK. This means that the UEMEK generates the RST signal to the SIM. The card detection is taken from the BSI signal, which detects the removal of the battery. A comparator inside the UEMEK monitors the BSI signal from the SimCardDet input. The threshold voltage is calculated from the battery size specifications.

First, the SW attempts to power up the SIM with 1.8V. If this does not succeed, power up is repeated with VSIM switched to 3V.

The data communication between the card and the phone is asynchronous half duplex. The clock supplied to the card is in GSM system 1.083MHz or 3.25MHz. The data baud rate is SIM card clock frequency divided by 372 (by default), 64, 32, or 16.

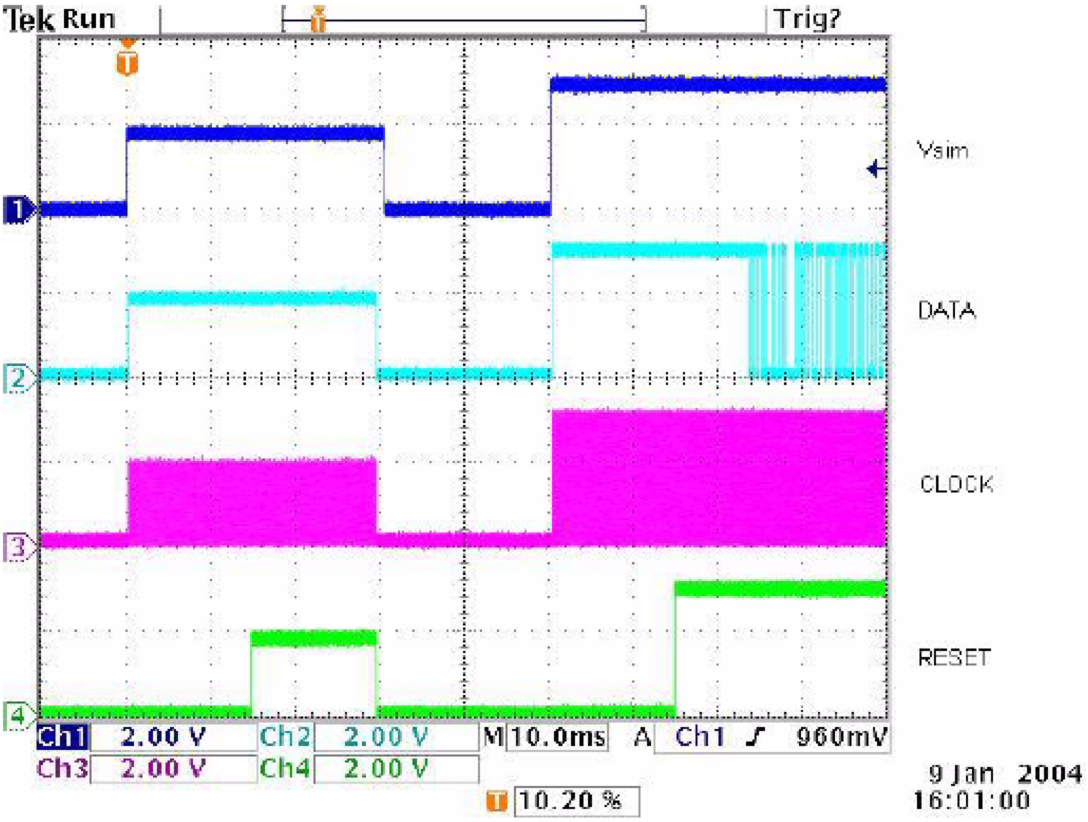


Figure 98 SIM power up waveform

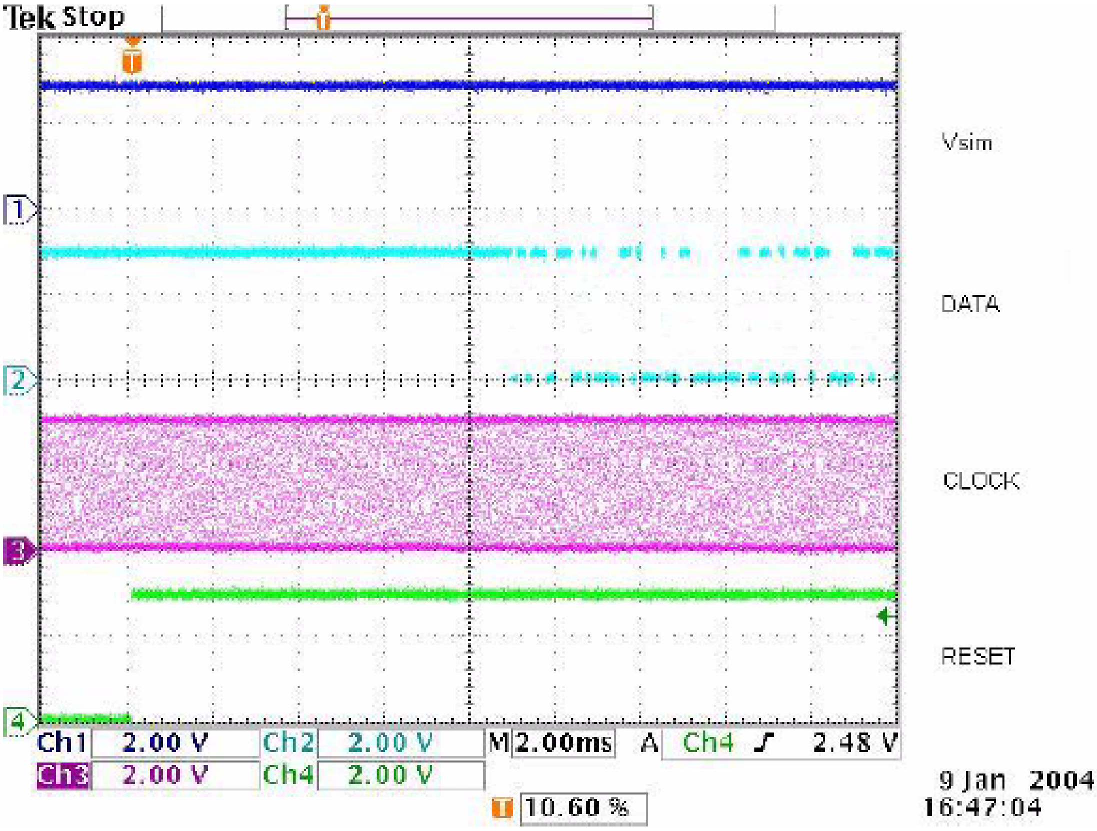


Figure 99 SIM answer to reset waveform

■ "Insert SIM Card" in device display although card is inserted

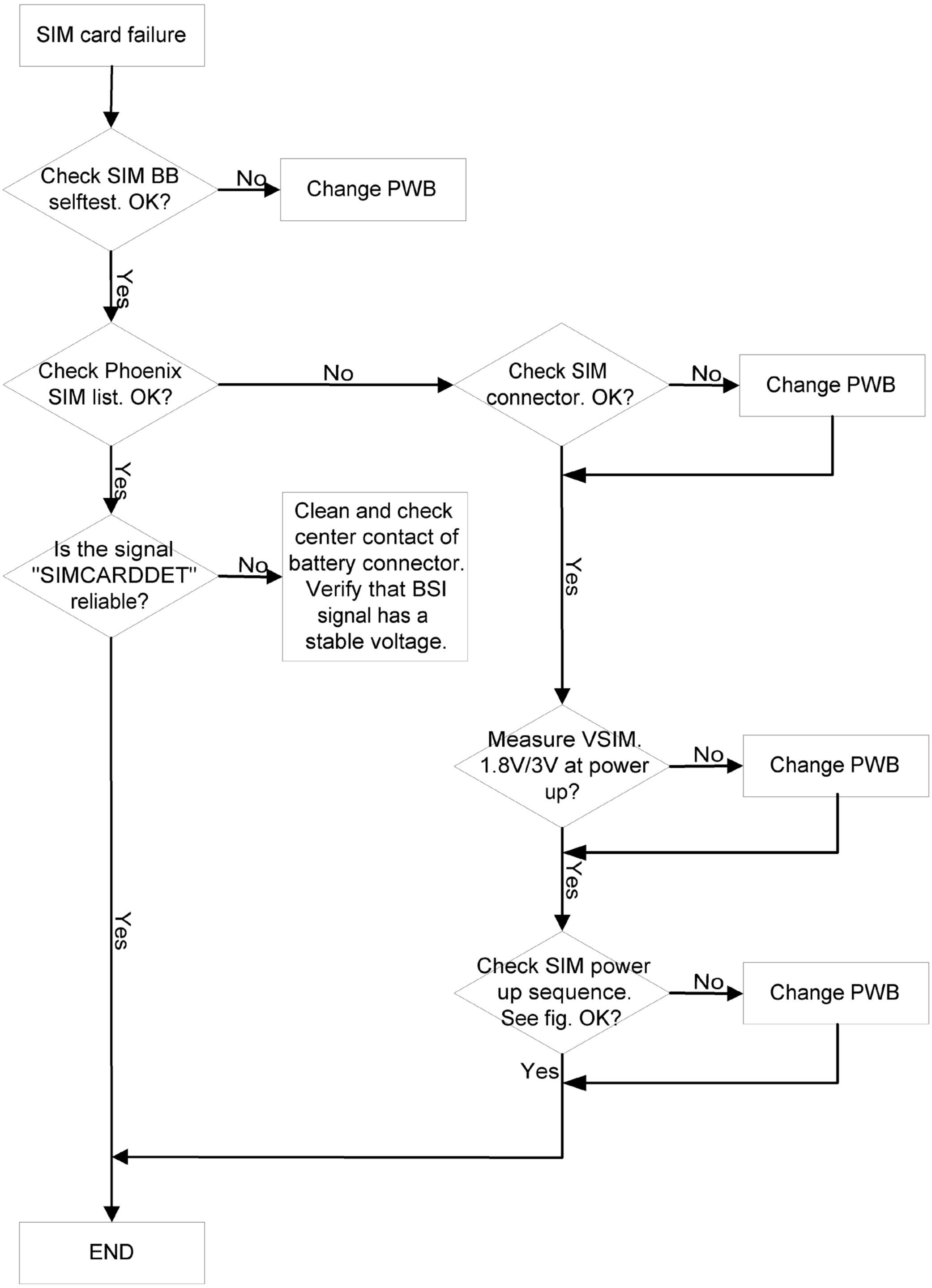

SIM card failure
Check SIM BB selftest. OK?
No
Change PWB
Yes
Check Phoenix SIM list. OK?
No
Check SIM connector. OK?
No
Change PWB
Yes
Is the signal "SIMCARDDET" reliable?
No
Clean and check center contact of battery connector. Verify that BSI signal has a stable voltage.
Yes
Measure VSIM. 1.8V/3V at power up?
No
Change PWB
Yes
Check SIM power up sequence. See fig. OK?
No
Change PWB
Yes
Yes
END

Figure 100 “Insert SIM Card” in device display although card is inserted

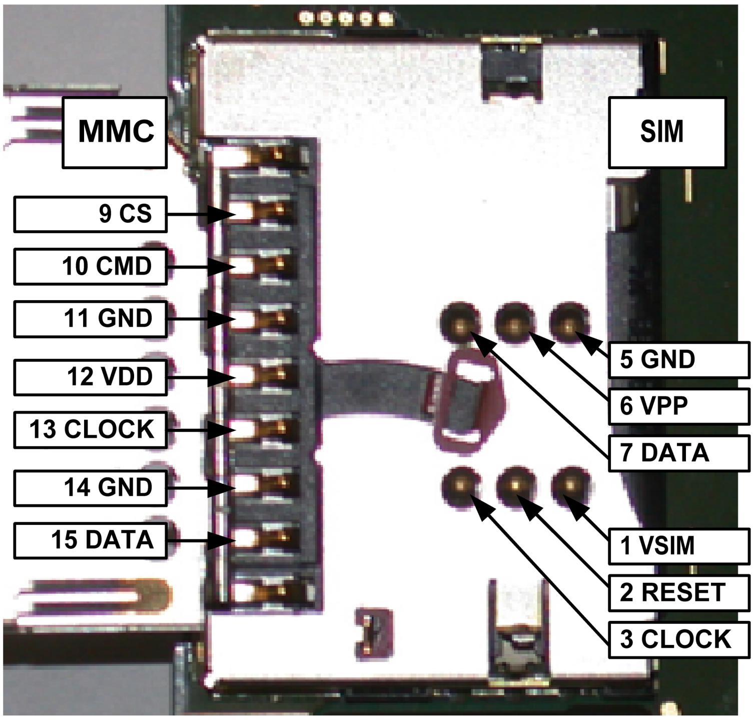

MMC
SIM
9 CS
10 CMD
11 GND
12 VDD
13 CLOCK
14 GND
15 DATA
5 GND
6 VPP
7 DATA
1 VSIM
2 RESET
3 CLOCK

Figure 101 MMC and SIM card connector

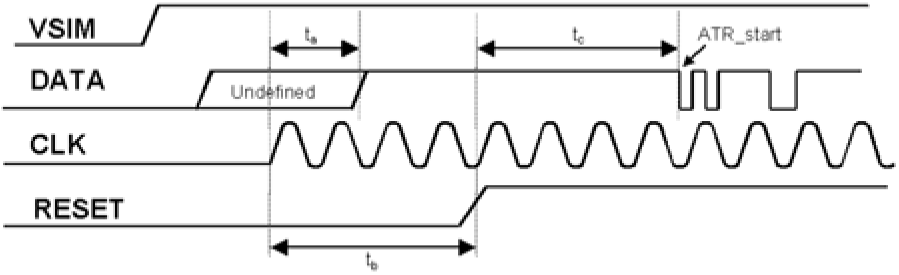

VSIM
DATA
CLK
RESET
Undefined
ATR_start
t_a
t_c
t_b

Figure 102 SIM power up waveform

Troubleshooting keypad interface

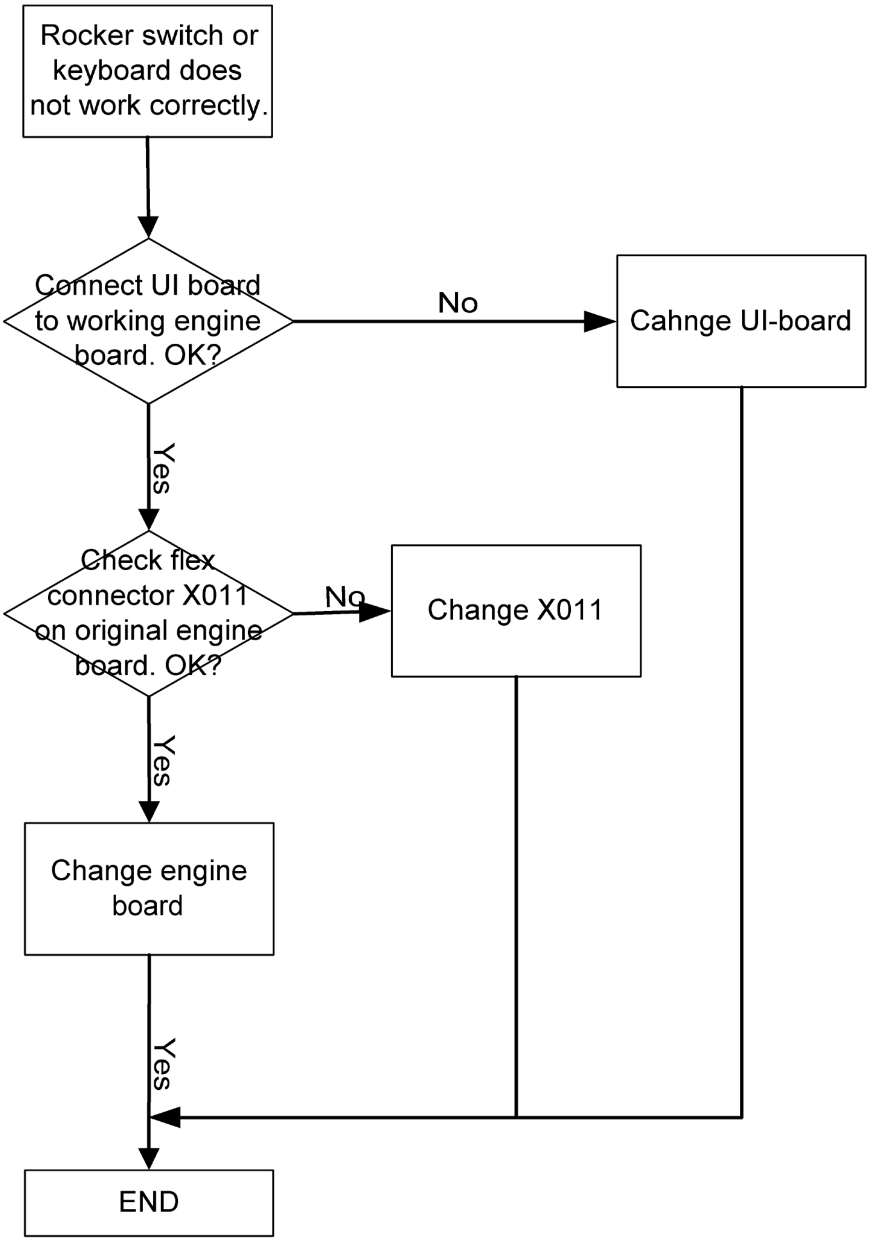

Rocker switch or keyboard does not work correctly.
Connect UI board to working engine board. OK?
No
Cahnge UI-board
Yes
Check flex connector X011 on original engine board. OK?
No
Change X011
Yes
Change engine board
Yes
END

Figure 103 Troubleshooting keypad interface

Troubleshooting the display

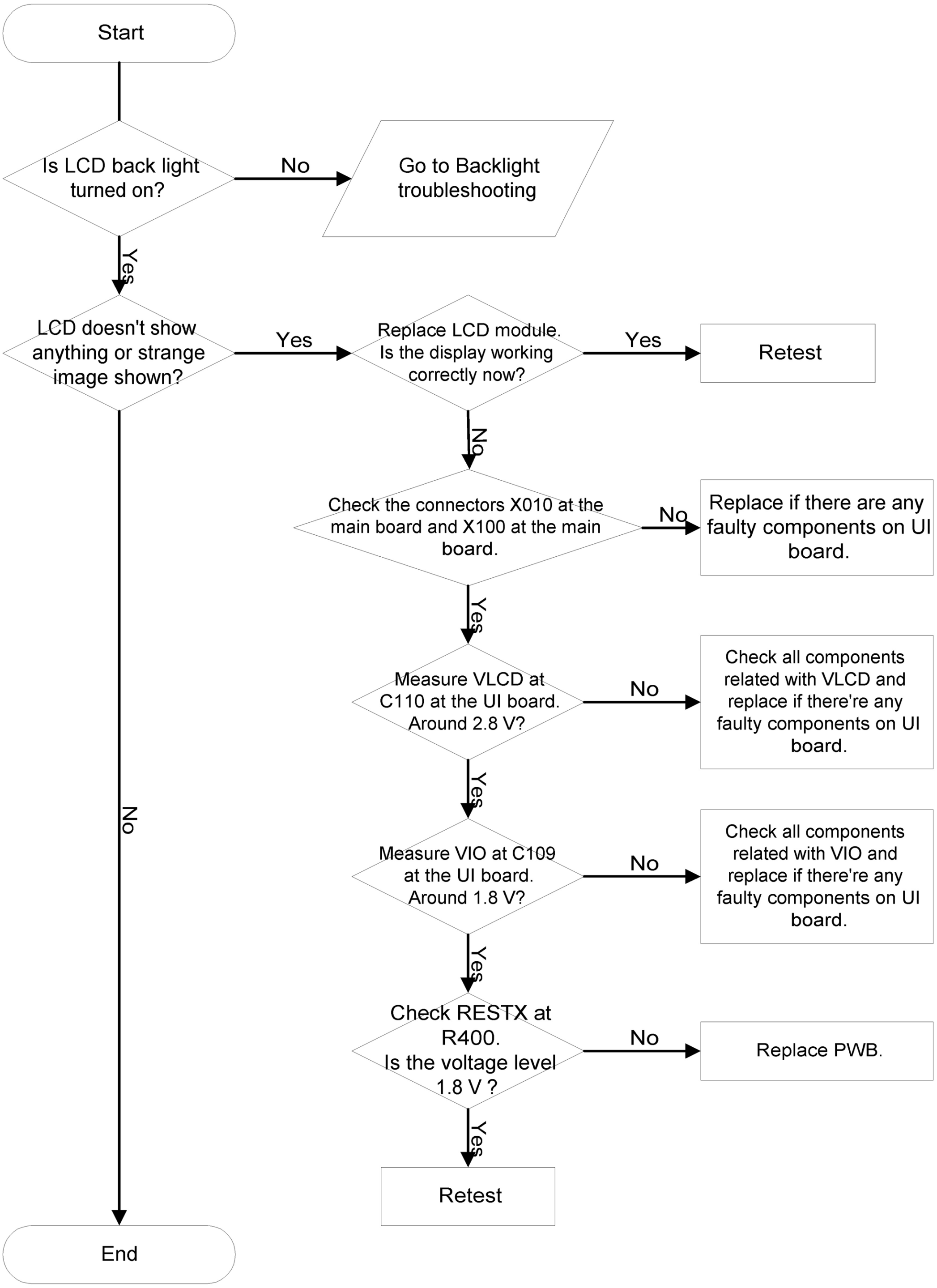

Start
Is LCD back light turned on?
No
Go to Backlight troubleshooting
Yes
LCD doesn't show anything or strange image shown?
Yes
Replace LCD module. Is the display working correctly now?
Yes
Retest
No
Check the connectors X010 at the main board and X100 at the main board.
No
Replace if there are any faulty components on UI board.
Yes
Measure VLCD at C110 at the UI board. Around 2.8 V?
No
Check all components related with VLCD and replace if there're any faulty components on UI board.
Yes
Measure VIO at C109 at the UI board. Around 1.8 V?
No
Check all components related with VIO and replace if there're any faulty components on UI board.
Yes
Check RESTX at R400. Is the voltage level 1.8 V ?
No
Replace PWB.
Yes
Retest
No
End

Figure 104 Display troubleshooting

Troubleshooting display and keyboard backlight

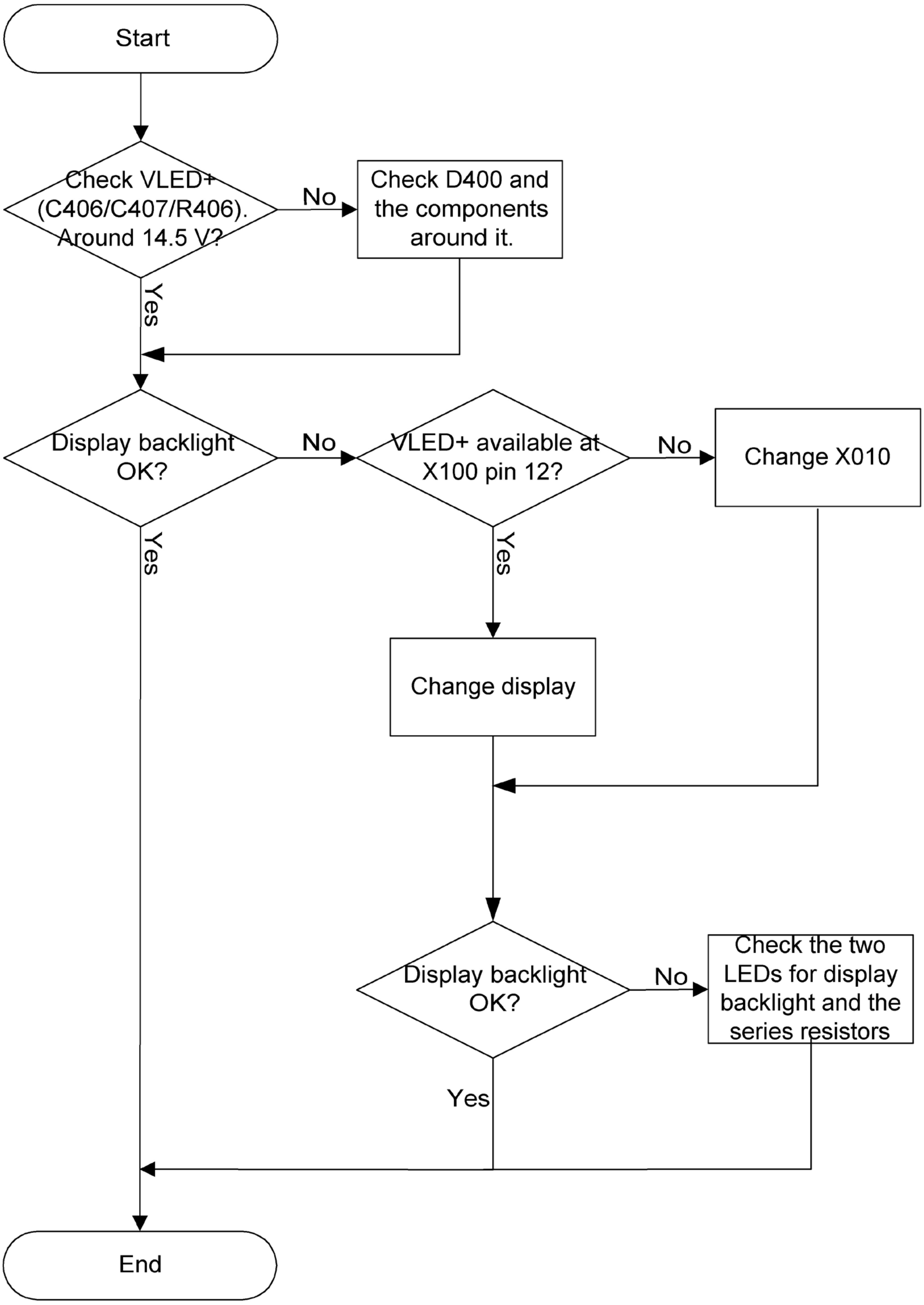

Start
Check VLED+ (C406/C407/R406). Around 14.5 V?
No
Check D400 and the components around it.
Yes
Display backlight OK?
No
VLED+ available at X100 pin 12?
No
Change X010
Yes
Yes
Change display
Display backlight OK?
No
Check the two LEDs for display backlight and the series resistors
Yes
End

Figure 105 Troubleshooting display and keyboard backlight

Troubleshooting MMC interface

Context

Use a known working MMC to save the photo test. Target devices to replace are N310 Lester, R315 ASIP and X820 MMC connector. The MMC card itself might be broken, and it should be checked as well.

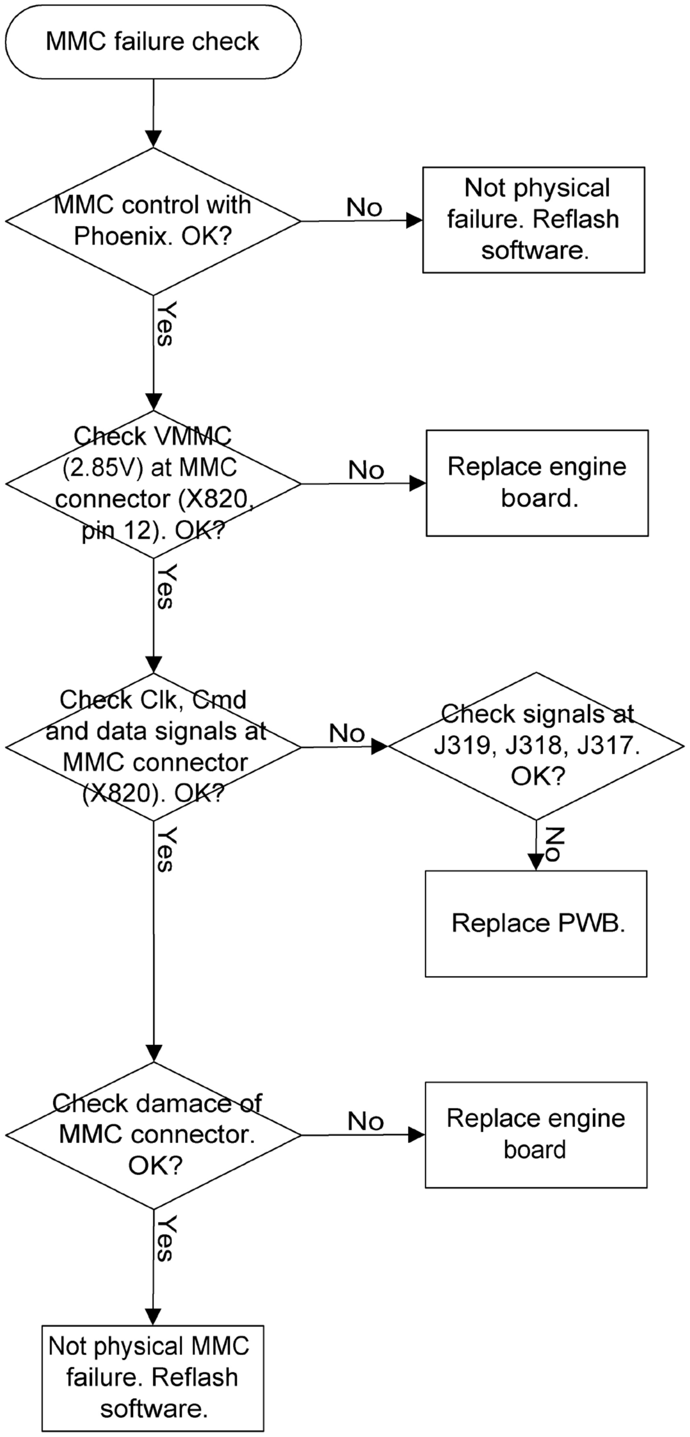

MMC failure check
MMC control with Phoenix. OK?
No
Not physical failure. Reflash software.
Yes
Check VMMC (2.85V) at MMC connector (X820, pin 12). OK?
No
Replace engine board.
Yes
Check Clk, Cmd and data signals at MMC connector (X820). OK?
No
Check signals at J319, J318, J317. OK?
No
Replace PWB.
Yes
Check damace of MMC connector. OK?
No
Replace engine board
Yes
Not physical MMC failure. Reflash software.

Figure 106 Troubleshooting MMC interface

Audio troubleshooting

Troubleshooting internal microphone

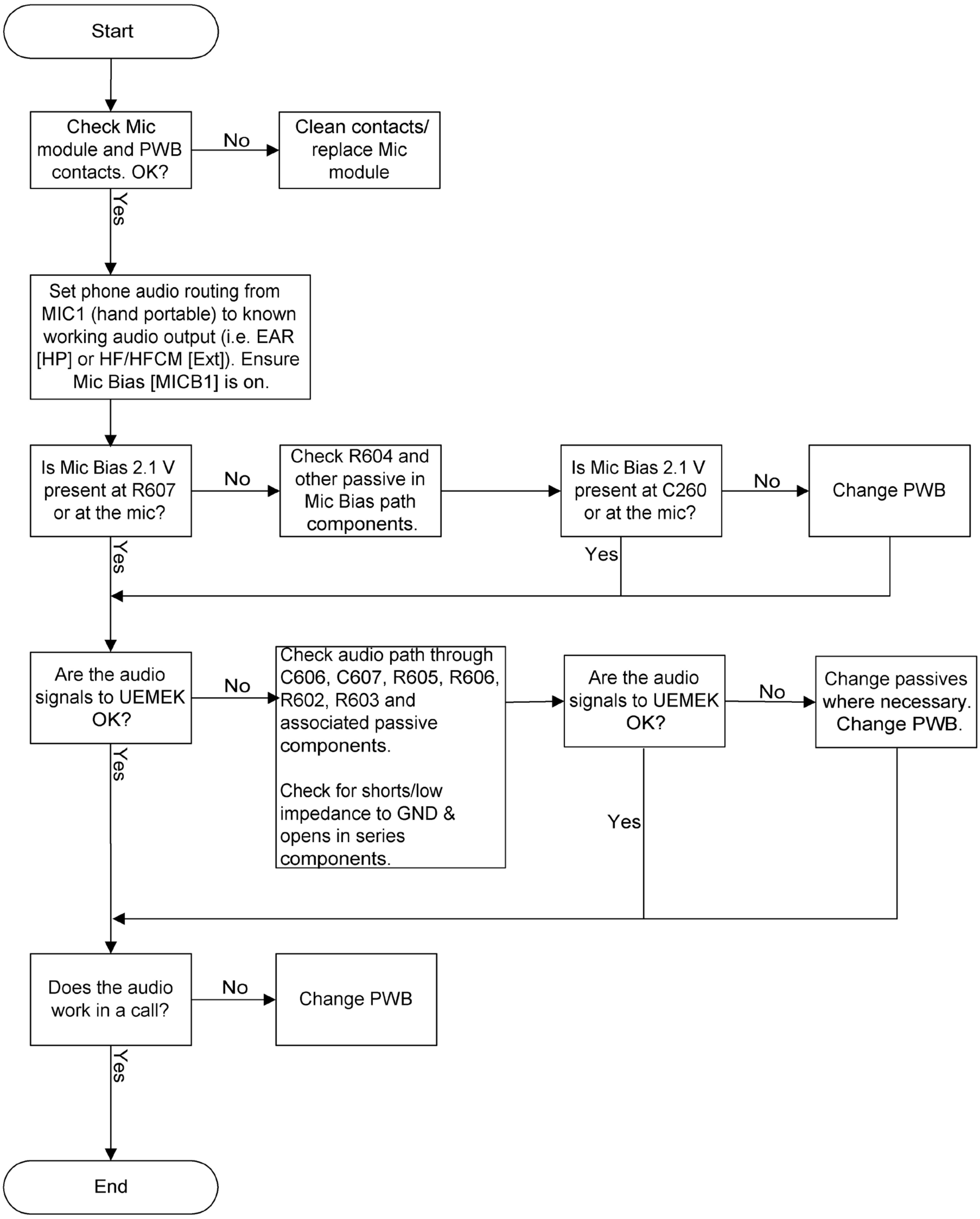

Start
Check Mic module and PWB contacts. OK?
No
Clean contacts/ replace Mic module
Yes
Set phone audio routing from MIC1 (hand portable) to known working audio output (i.e. EAR [HP] or HF/HFCM [Ext]). Ensure Mic Bias [MICB1] is on.
Is Mic Bias 2.1 V present at R607 or at the mic?
No
Check R604 and other passive in Mic Bias path components.
Is Mic Bias 2.1 V present at C260 or at the mic?
No
Change PWB
Yes
Yes
Are the audio signals to UEMEK OK?
No
Check audio path through C606, C607, R605, R606, R602, R603 and associated passive components.
Check for shorts/low impedance to GND & opens in series components.
Are the audio signals to UEMEK OK?
No
Change passives where necessary. Change PWB.
Yes
Yes
Does the audio work in a call?
No
Change PWB
Yes
End

Figure 107 Troubleshooting internal microphone

Troubleshooting external microphone

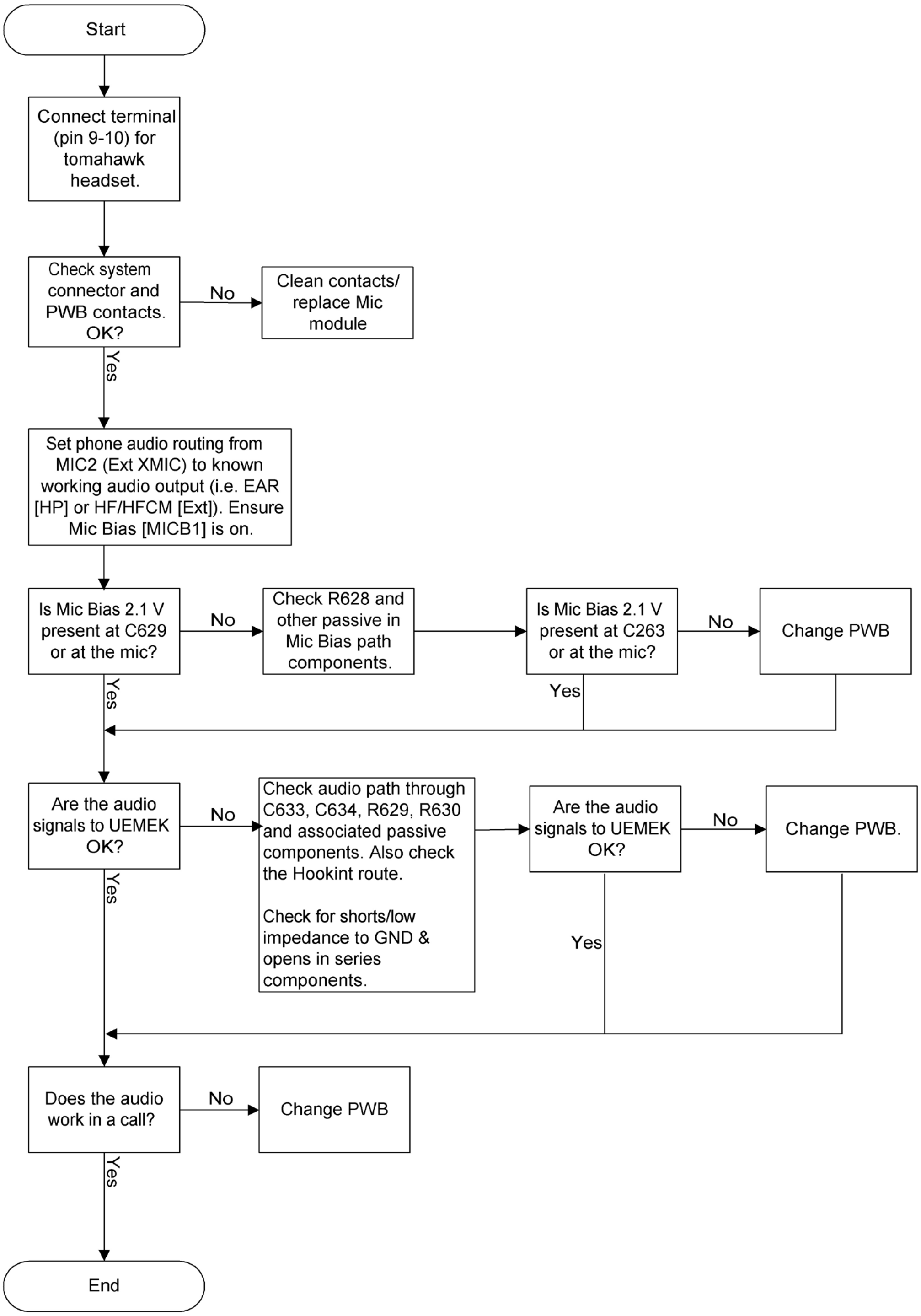

Start
Connect terminal (pin 9-10) for tomahawk headset.
Check system connector and PWB contacts. OK?
No
Clean contacts/ replace Mic module
Yes
Set phone audio routing from MIC2 (Ext XMIC) to known working audio output (i.e. EAR [HP] or HF/HFCM [Ext]). Ensure Mic Bias [MICB1] is on.
Is Mic Bias 2.1 V present at C629 or at the mic?
No
Check R628 and other passive in Mic Bias path components.
Is Mic Bias 2.1 V present at C263 or at the mic?
No
Change PWB
Yes
Yes
Are the audio signals to UEMEK OK?
No
Check audio path through C633, C634, R629, R630 and associated passive components. Also check the Hookint route.
Check for shorts/low impedance to GND & opens in series components.
Are the audio signals to UEMEK OK?
No
Change PWB.
Yes
Yes
Does the audio work in a call?
No
Change PWB
Yes
End

Figure 108 Troubleshooting external microphone

Troubleshooting internal earpiece

Before you begin

Check that holes in earpiece are not coated or covered.

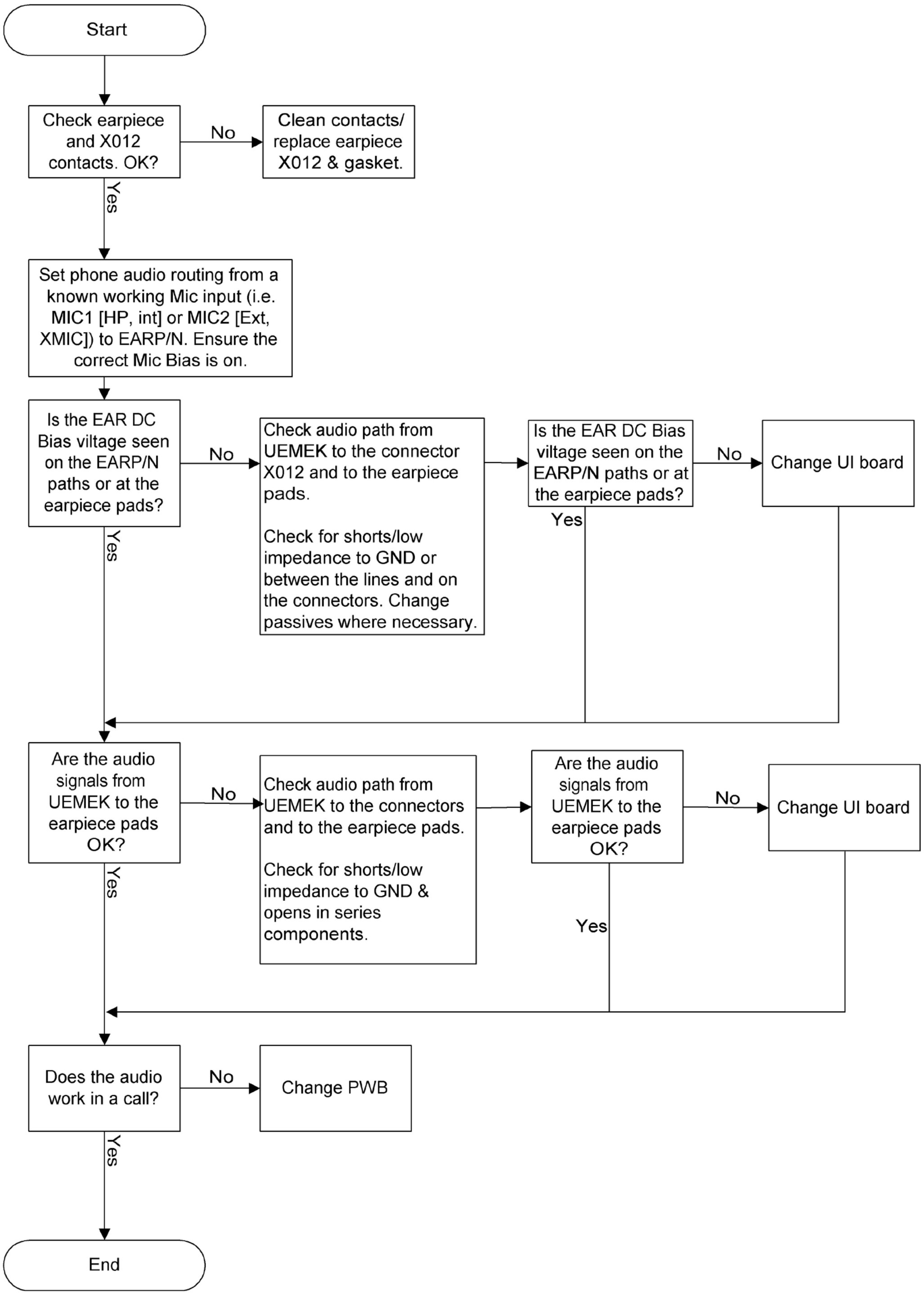

Start
Check earpiece and X012 contacts. OK?
No
Clean contacts/ replace earpiece X012 & gasket.
Yes
Set phone audio routing from a known working Mic input (i.e. MIC1 [HP, int] or MIC2 [Ext, XMIC]) to EARP/N. Ensure the correct Mic Bias is on.
Is the EAR DC Bias viltage seen on the EARP/N paths or at the earpiece pads?
No
Check audio path from UEMEK to the connector X012 and to the earpiece pads.
Check for shorts/low impedance to GND or between the lines and on the connectors. Change passives where necessary.
Is the EAR DC Bias viltage seen on the EARP/N paths or at the earpiece pads?
No
Change UI board
Yes
Yes
Are the audio signals from UEMEK to the earpiece pads OK?
No
Check audio path from UEMEK to the connectors and to the earpiece pads.
Check for shorts/low impedance to GND & opens in series components.
Are the audio signals from UEMEK to the earpiece pads OK?
No
Change UI board
Yes
Yes
Does the audio work in a call?
No
Change PWB
Yes
End

Figure 109 Troubleshooting internal earpiece

Troubleshooting external earpiece

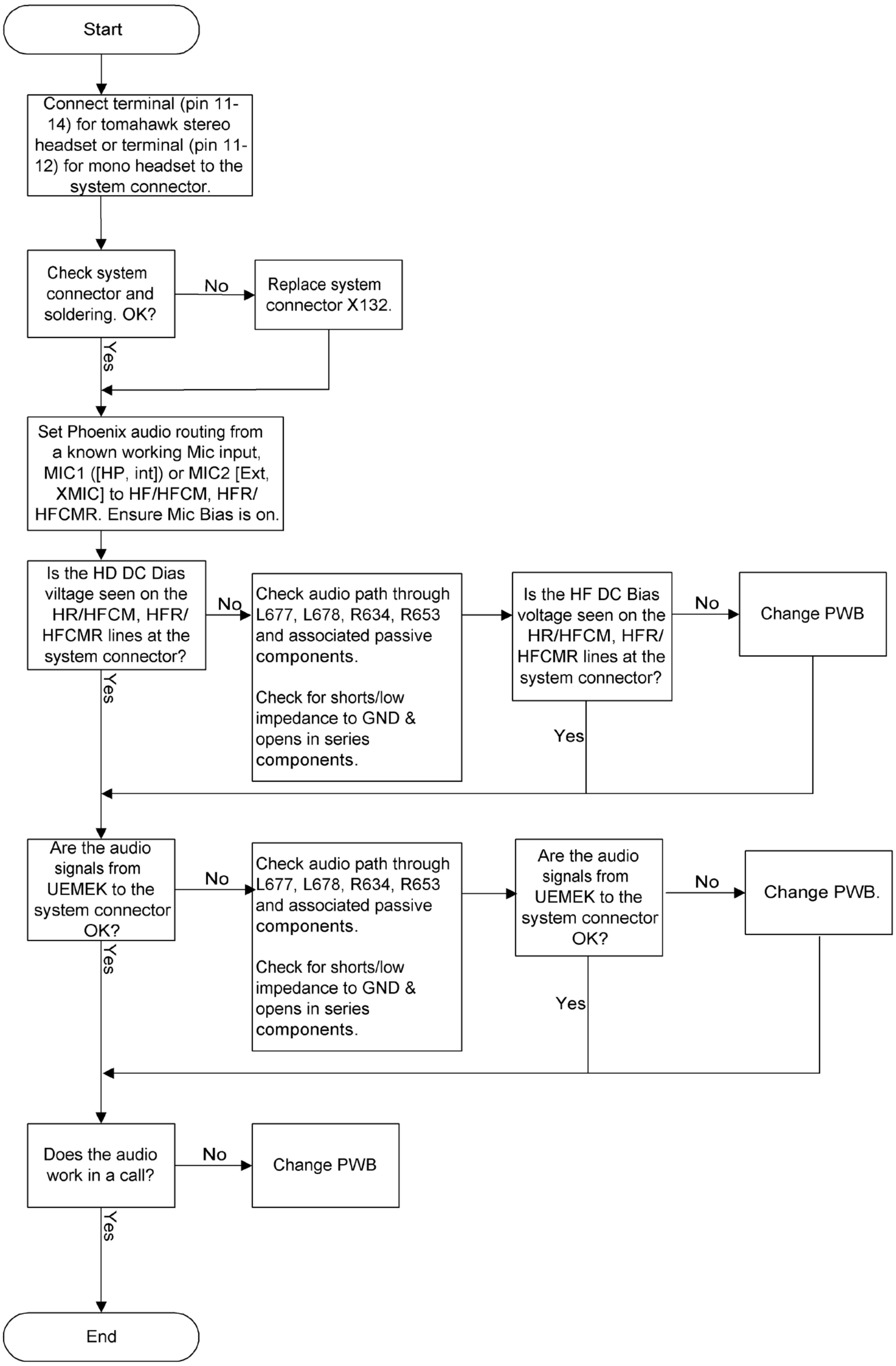

Start
Connect terminal (pin 11-14) for tomahawk stereo headset or terminal (pin 11-12) for mono headset to the system connector.
Check system connector and soldering. OK?
No
Replace system connector X132.
Yes
Set Phoenix audio routing from a known working Mic input, MIC1 ([HP, int]) or MIC2 [Ext, XMIC] to HF/HFCM, HFR/HFCMR. Ensure Mic Bias is on.
Is the HD DC Dias viltage seen on the HR/HFCM, HFR/HFCMR lines at the system connector?
No
Check audio path through L677, L678, R634, R653 and associated passive components.
Check for shorts/low impedance to GND & opens in series components.
Is the HF DC Bias voltage seen on the HR/HFCM, HFR/HFCMR lines at the system connector?
No
Change PWB
Yes
Yes
Are the audio signals from UEMEK to the system connector OK?
No
Check audio path through L677, L678, R634, R653 and associated passive components.
Check for shorts/low impedance to GND & opens in series components.
Are the audio signals from UEMEK to the system connector OK?
No
Change PWB.
Yes
Yes
Does the audio work in a call?
No
Change PWB
Yes
End

Figure 110 Troubleshooting external earpiece

Troubleshooting IHF

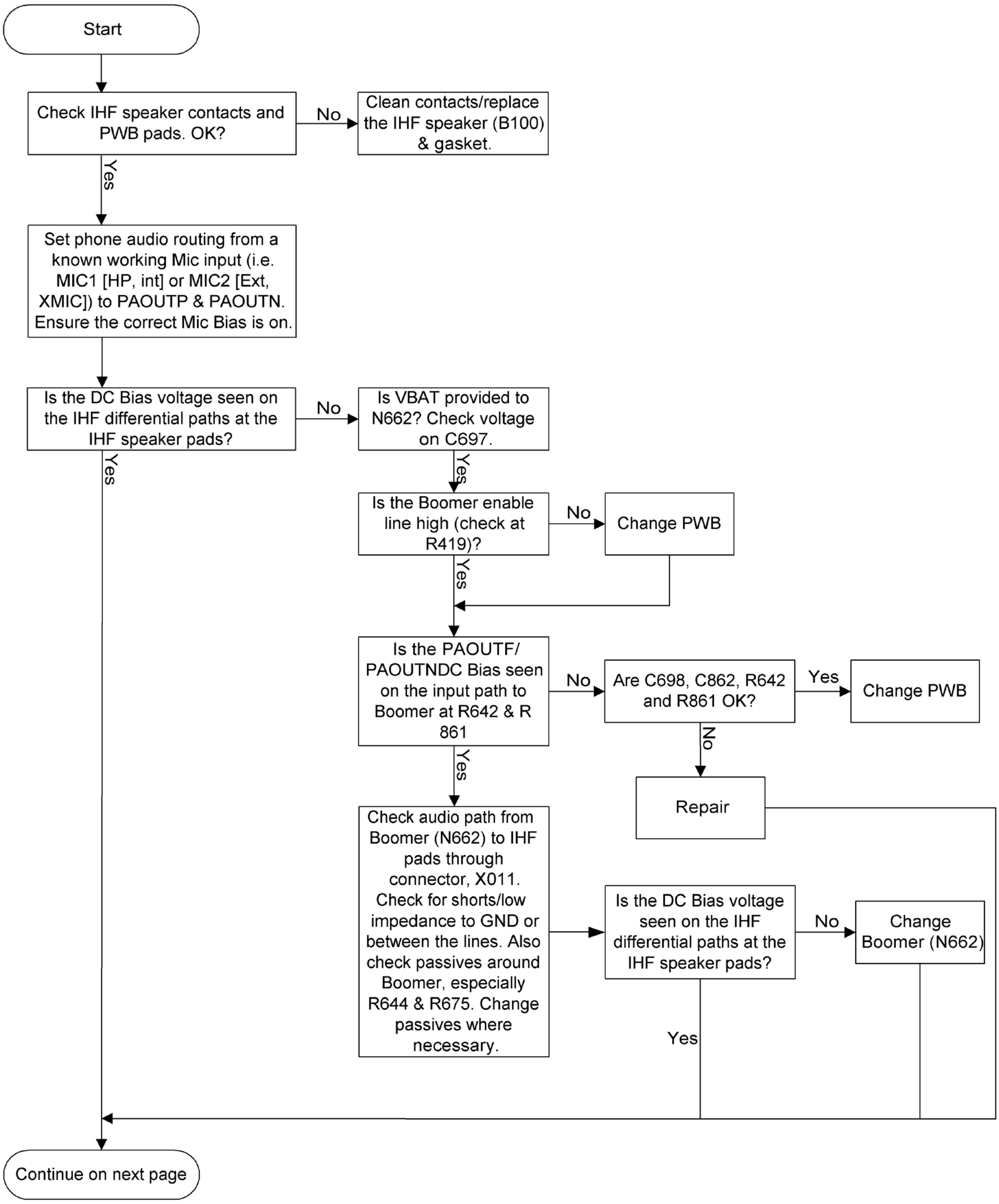

Start
Check IHF speaker contacts and PWB pads. OK?
No
Clean contacts/replace the IHF speaker (B100) & gasket.
Yes
Set phone audio routing from a known working Mic input (i.e. MIC1 [HP, int] or MIC2 [Ext, XMIC]) to PAOUTP & PAOUTN. Ensure the correct Mic Bias is on.
Is the DC Bias voltage seen on the IHF differential paths at the IHF speaker pads?
No
Is VBAT provided to N662? Check voltage on C697.
Yes
Yes
Is the Boomer enable line high (check at R419)?
No
Change PWB
Yes
Is the PAOUTF/ PAOUTNDC Bias seen on the input path to Boomer at R642 & R 861
No
Are C698, C862, R642 and R861 OK?
Yes
Change PWB
No
Repair
Yes
Check audio path from Boomer (N662) to IHF pads through connector, X011. Check for shorts/low impedance to GND or between the lines. Also check passives around Boomer, especially R644 & R675. Change passives where necessary.
Is the DC Bias voltage seen on the IHF differential paths at the IHF speaker pads?
No
Change Boomer (N662)
Yes
Continue on next page

Figure 111 Troubleshooting IHF

See also the following chart.

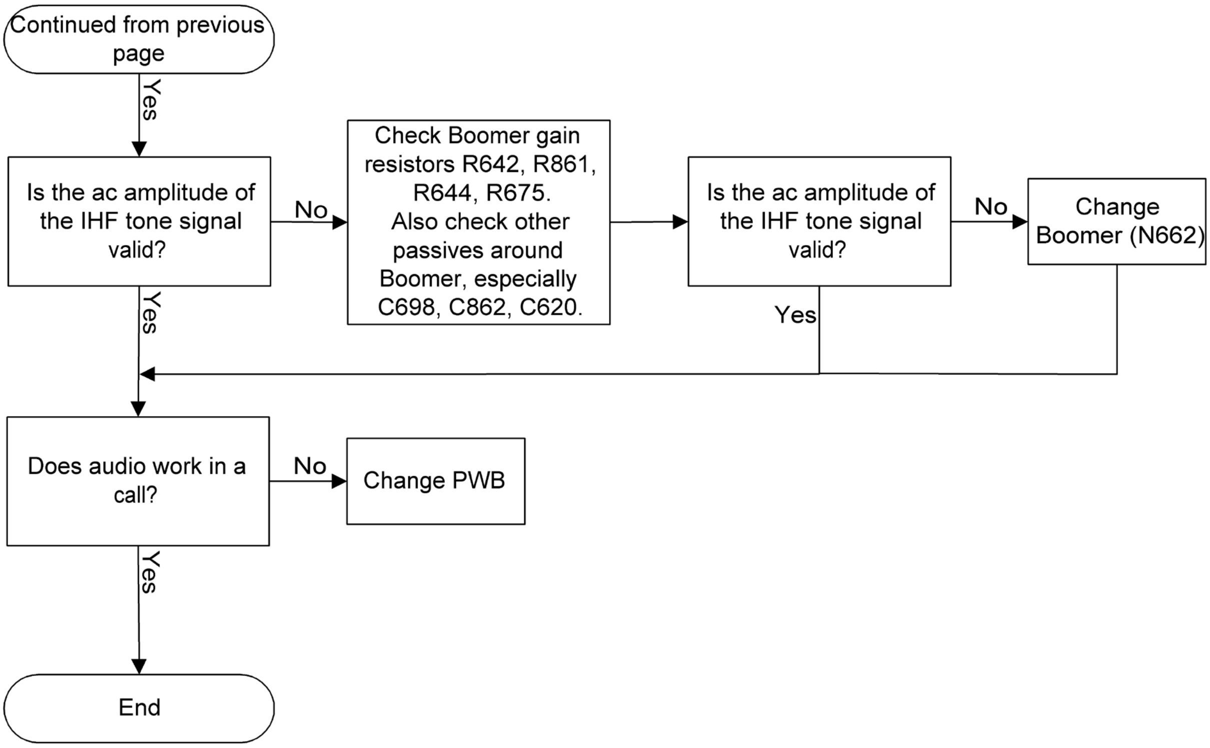

Continued from previous page
Yes
Is the ac amplitude of the IHF tone signal valid?
No
Check Boomer gain resistors R642, R861, R644, R675. Also check other passives around Boomer, especially C698, C862, C620.
Is the ac amplitude of the IHF tone signal valid?
No
Change Boomer (N662)
Yes
Yes
Does audio work in a call?
No
Change PWB
Yes
End

Figure 112 Troubleshooting IHF (continued)

Troubleshooting accessory detection

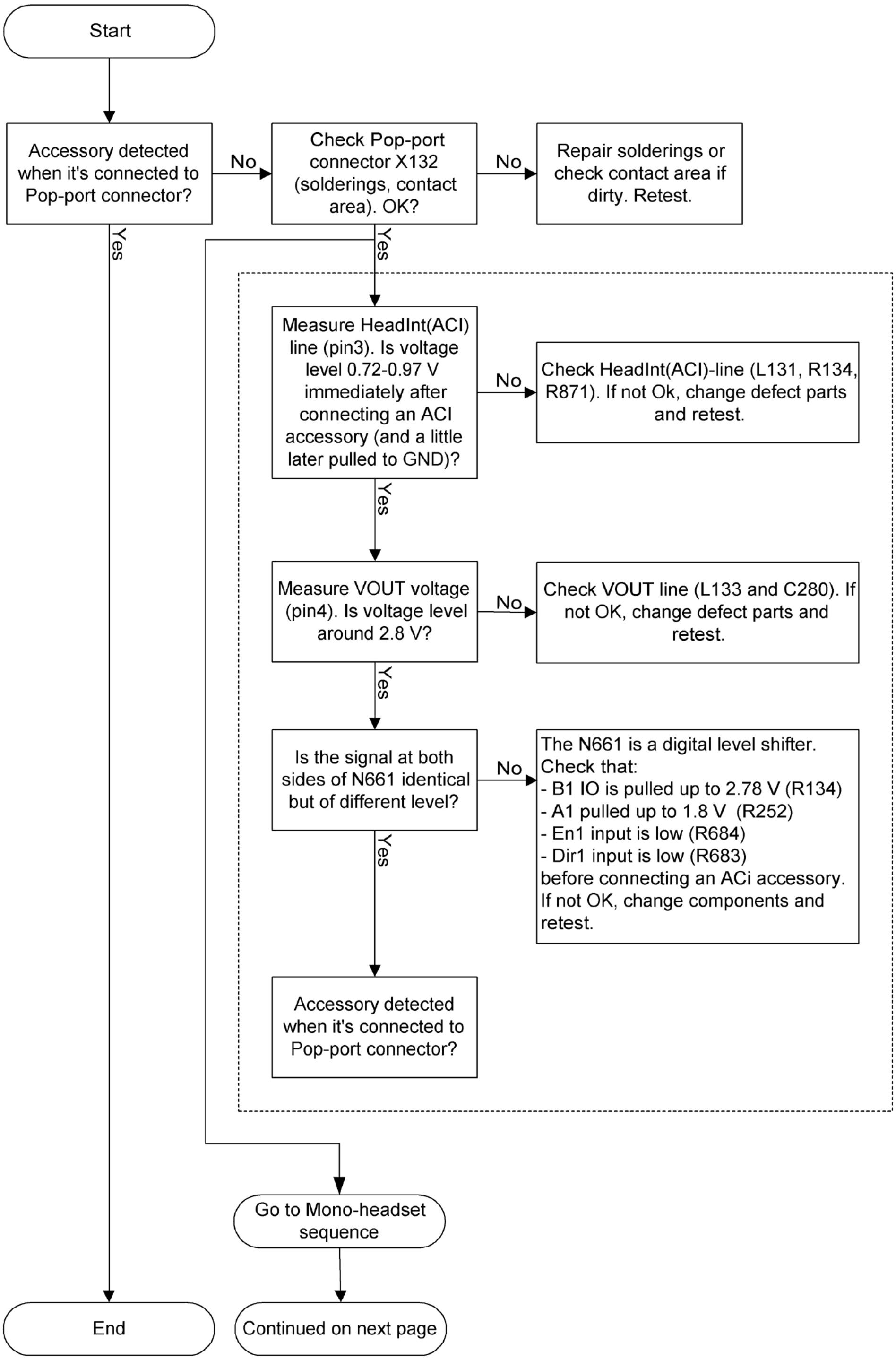

Start
Accessory detected when it's connected to Pop-port connector?
No
Check Pop-port connector X132 (solderings, contact area). OK?
No
Repair solderings or check contact area if dirty. Retest.
Yes
Yes
Measure HeadInt(ACI) line (pin3). Is voltage level 0.72-0.97 V immediately after connecting an ACI accessory (and a little later pulled to GND)?
No
Check HeadInt(ACI)-line (L131, R134, R871). If not Ok, change defect parts and retest.
Yes
Measure VOUT voltage (pin4). Is voltage level around 2.8 V?
No
Check VOUT line (L133 and C280). If not OK, change defect parts and retest.
Yes
Is the signal at both sides of N661 identical but of different level?
No
The N661 is a digital level shifter. Check that:
- B1 IO is pulled up to 2.78 V (R134)
- A1 pulled up to 1.8 V (R252)
- En1 input is low (R684)
- Dir1 input is low (R683)
before connecting an ACi accessory. If not OK, change components and retest.
Yes
Accessory detected when it's connected to Pop-port connector?
Go to Mono-headset sequence
End
Continued on next page

Figure 113 Troubleshooting accessory detection

See also the following flow chart.

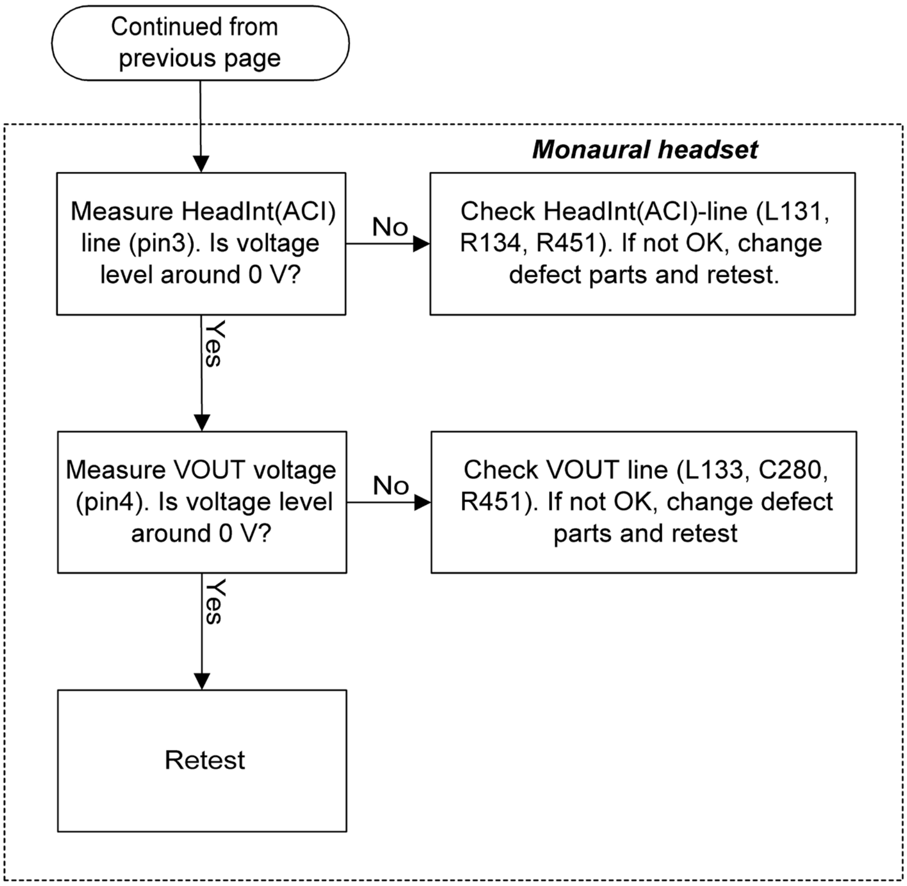

Continued from previous page
Monaural headset
Measure HeadInt(ACI) line (pin3). Is voltage level around 0 V?
No
Check HeadInt(ACI)-line (L131, R134, R451). If not OK, change defect parts and retest.
Yes
Measure VOUT voltage (pin4). Is voltage level around 0 V?
No
Check VOUT line (L133, C280, R451). If not OK, change defect parts and retest
Yes
Retest

Figure 114 Troubleshooting accessory detection (continued)

Troubleshooting IrDA

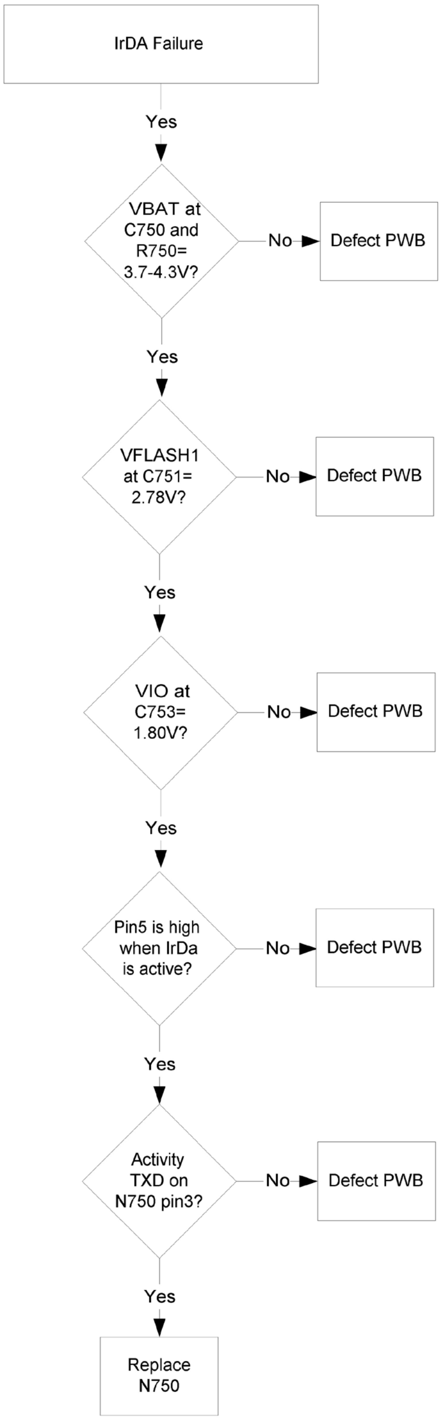

IrDA Failure
Yes
VBAT at C750 and R750= 3.7-4.3V?
No
Defect PWB
Yes
VFLASH1 at C751= 2.78V?
No
Defect PWB
Yes
VIO at C753= 1.80V?
No
Defect PWB
Yes
Pin5 is high when IrDa is active?
No
Defect PWB
Yes
Activity TXD on N750 pin3?
No
Defect PWB
Yes
Replace N750

Figure 115 Troubleshooting IrDA

Troubleshooting FM radio

Before you begin

In Phoenix: choose *Testing -> FM radio -> Power on*.

For FM signal:

- Use FM signal received by headset,

  or
- use FM signal generator: Frequency = 100MHz, frequency deviation = 67.5kHz, modulation frequency = 1kHz, R = L, pilot tone on and RF level = -67dBm.

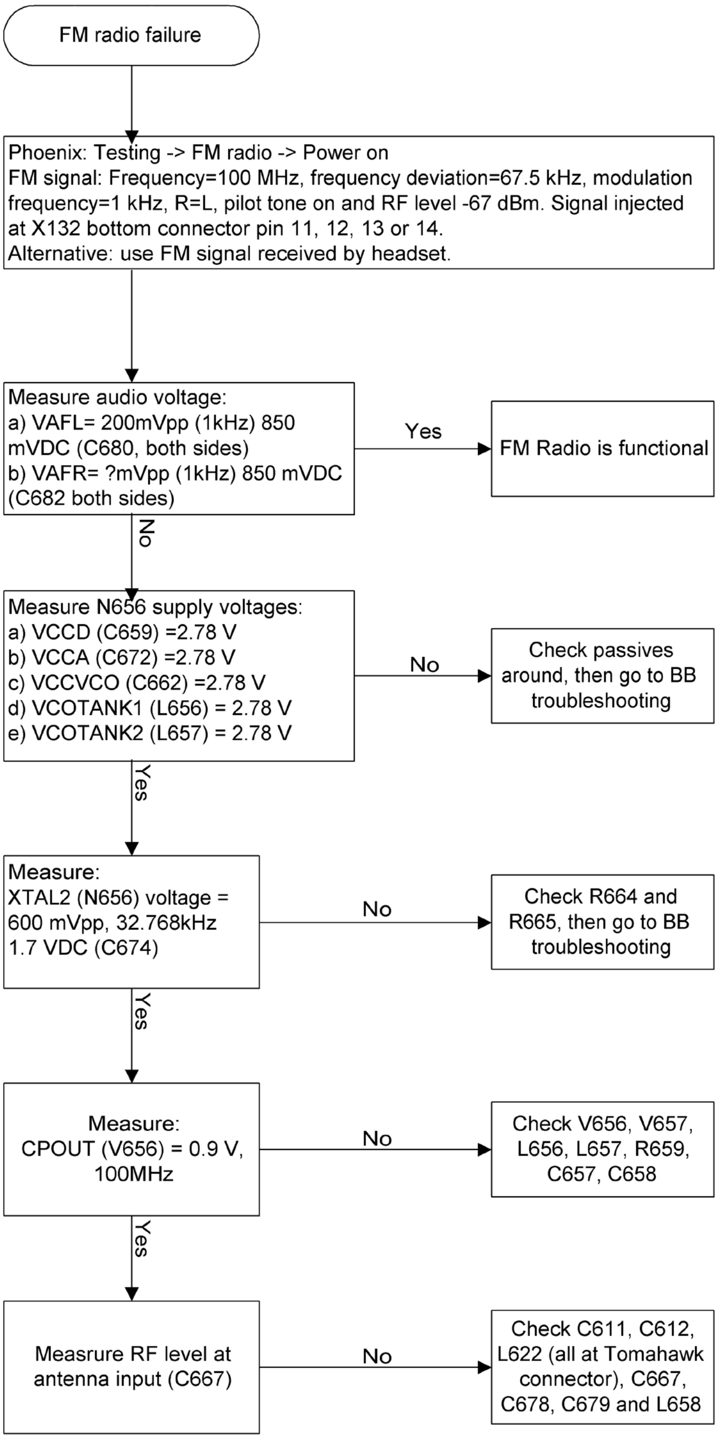

FM radio failure
Phoenix: Testing -> FM radio -> Power on
FM signal: Frequency=100 MHz, frequency deviation=67.5 kHz, modulation frequency=1 kHz, R=L, pilot tone on and RF level -67 dBm. Signal injected at X132 bottom connector pin 11, 12, 13 or 14.
Alternative: use FM signal received by headset.
Measure audio voltage:
a) VAFL= 200mVpp (1kHz) 850 mVDC (C680, both sides)
b) VAFR= ?mVpp (1kHz) 850 mVDC (C682 both sides)
Yes
FM Radio is functional
No
Measure N656 supply voltages:
a) VCCD (C659) =2.78 V
b) VCCA (C672) =2.78 V
c) VCCVCO (C662) =2.78 V
d) VCOTANK1 (L656) = 2.78 V
e) VCOTANK2 (L657) = 2.78 V
No
Check passives around, then go to BB troubleshooting
Yes
Measure:
XTAL2 (N656) voltage = 600 mVpp, 32.768kHz
1.7 VDC (C674)
No
Check R664 and R665, then go to BB troubleshooting
Yes
Measure:
CPOUT (V656) = 0.9 V, 100MHz
No
Check V656, V657, L656, L657, R659, C657, C658
Yes
Measrure RF level at antenna input (C667)
No
Check C611, C612, L622 (all at Tomahawk connector), C667, C678, C679 and L658

Figure 116 Troubleshooting FM radio

Tuning baseband

Before you begin

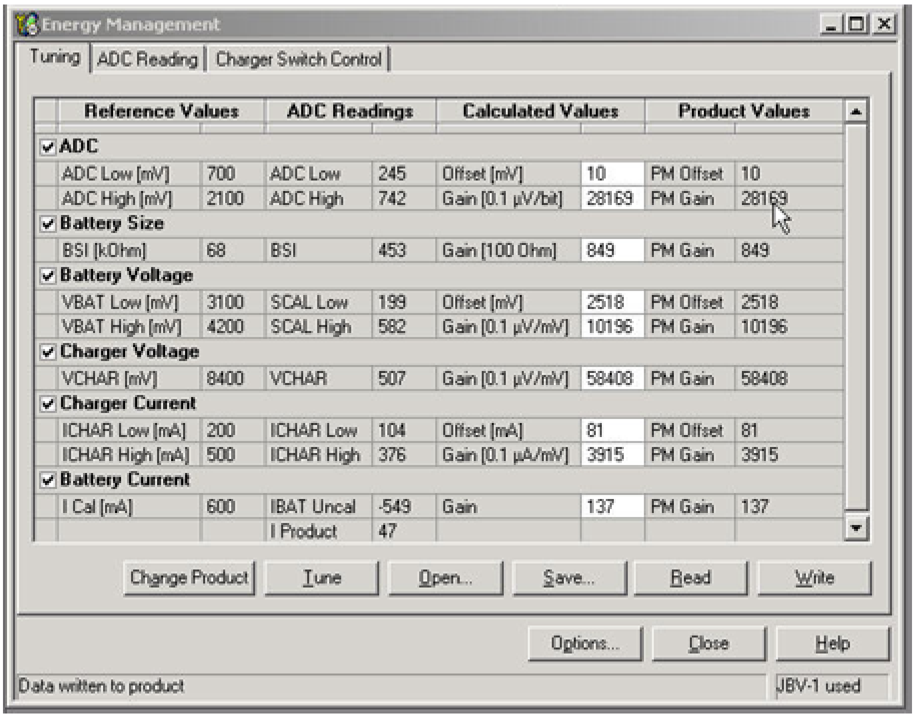
EM (Energy Management) calibration is performed to calibrate the setting (gain and offset) of AD converters in several channels (that is, battery voltage, BSI, charger voltage, charger current) to get an accurate AD conversion result.

HW setup:

- An external power supply is needed.
- The mobile device must be connected to JBV-1 (docking station) with DA-44 (docking station adapter).
  - a Connect SCB-3 (DC-DC cable) between JBV-1 and charger connector of phone for charger channel calibration.
  - b Supply 11-16V DC from an external power supply to JBV-1 to power up phone.

Phoenix SW setup:

- Start Phoenix service software.
- Select *FBUS connection*.
- Choose: *Main -> Product -> RM-51*.
- Choose: *Tuning -> Energy Management Calibration*.



Reference Values		ADC Readings		Calculated Values		Product Values	
☑ ADC							
ADC Low [mV]	700	ADC Low	245	Offset [mV]	10	PM Offset	10
ADC High [mV]	2100	ADC High	742	Gain [0.1 µV/bit]	28169	PM Gain	28169
☑ Battery Size							
BSI [kOhm]	68	BSI	453	Gain [100 Ohm]	849	PM Gain	849
☑ Battery Voltage							
VBAT Low [mV]	3100	SCAL Low	199	Offset [mV]	2518	PM Offset	2518
VBAT High [mV]	4200	SCAL High	582	Gain [0.1 µV/mV]	10196	PM Gain	10196
☑ Charger Voltage							
VCHAR [mV]	8400	VCHAR	507	Gain [0.1 µV/mV]	58408	PM Gain	58408
☑ Charger Current							
ICHAR Low [mA]	200	ICHAR Low	104	Offset [mA]	81	PM Offset	81
ICHAR High [mA]	500	ICHAR High	376	Gain [0.1 µA/mV]	3915	PM Gain	3915
☑ Battery Current							
I Cal [mA]	600	IBAT Uncal	-549	Gain	137	PM Gain	137
		I Product	47				

Data written to product

JBV-1 used

Figure 117 EM calibration window

Steps

1. Select “Read” to show the current values in the phone memory, and then check that the communication with the phone works.
2. Select “JBV-1 used” check box under the options menu.
3. Select the item(s) you try to calibrate.

   Note: ADC has to be calibrated before other item(s). If the ADC value is correct or you calibrate ADC and other items at the same time, that’s OK.

4. Select “Tune”.

   Calibration is carried out automatically regarding the calibration item(s) that you selected.
5. The candidate of the new calibration values is shown in the “calculated” field. If the new calibration values seem to be reasonable (please refer to the calibration value limit table), select *Write* to store the new calibration value in the phone permanent memory.

Table 5 Calibration value limits

Parameter	Min.	Max.
ADC Gain	26500	28500
ADC Offset	-50	50
BSI Gain	950	1100
VBAT Gain	10000	11000
VBAT Offset	2300	2900
VCHAR Gain	58000	62000
ICHAR Gain	3750	4650
ICHAR Offset	0	150
IBAT Gain	50	160

6. Select “Read from phone” and confirm that the new calibration values are stored in the phone memory correctly. If not, please try to store by selecting “Write” again.
7. Close the Energy Management Calibration window.

Testing and tuning BB after component replacement

Context

The replacement of certain components which influences the energy management in the phone should be followed by a calibration.

Steps

1. Calibrate R133, the UEMEK - D250, the ZOCUS - N130 and R259.

Testing interfaces

The mobile device has a testing interface that is easy to access by service battery. The following signals are allocated on test pads.

Table 6 Testing and flashing interface electrical specifications

Pad No	Name	Dir	Parameter	Min	Typ	Max	Unit	Notes
1	STI_Tx	->	Vo			0.22*VIO	V	
			Voh	0.8*VIO			V	
2	VPP		To Phone	0 / 2.8 / 9 +/-3%			V	Prommer Select
3	FBusTx	->	Vol	0	2.7	0.3*VFlash 1	V	

Pad No	Name	Dir	Parameter	Min	Typ	Max	Unit	Notes
			Voh	0.7*VFlash1	2.7	VFlash1	V	
4	MBUS	<->	Vol	0	0.2	0.3*VFlash 1	V	
			Vil (From prommer)	0	0.2	0.3*VFlash 1	V	
			Voh	0.7*VFlash1	2.7	0.7*VFlash 1	V	
			Vih(From prommer)	0.7*VFlash1	2.7	VFlash1	V	
5	FBusRx	<-	Vil (From prommer)	0	2.7	0.3*VFlash 1	V	
			Vih(From prommer)	1.89	2.7	VFlash1	V	
			Abs. Max. Voltage to Test Pad Referenced to GND	-0.3V		3.0	V	Absolute Max Voltage limits to MBUS/FBUS
6	GND				0		V	VBAT GROUND
7	BSI_PULS		Vol	0	2.7	0.3*VFlash 1	V	Supplied from the flash programming device
			Voh	0.7*VFlash1	2.7	VFlash1	V	
8	ZOCUS							Used for manufacturing

Note: VFlash1 = 2.78 +/-3%, VIO = 1.8 +/-4.5%

Pin	Name	Min	Typ	Max	Unit	Notes
	VBAT	0	3.6	5.1	V	
	BSI_BATT	0	2.78	VFlash1	V	Internal pullup
	GND	0			V	

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7 — RF troubleshooting

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Introduction to RF troubleshooting

This document describes RF troubleshooting and tuning. In general, two types of measurements have to be done during troubleshooting and repair of phones:

- RF measurements shall be done with a spectrum analyzer, either connected directly to the RF connector of the RF adapter board SA-38, or used together with a high-frequency probe to measure RF signals at points along the TX or RX chain.
- LF (Low-Frequency) and DC measurements shall be done either with a multimeter, or with an oscilloscope together with a 10:1 probe.

All tuning must be done with Phoenix Service Software *a15_2004_7_55.exe_*, or later.

Always make sure that the measurement set-up has been calibrated when measuring RF parameters at the RF connector. Remember to include the correct losses in the module repair jig and the connecting cable when realigning the phone.

Most RF semiconductors are electrostatic discharge (ESD) sensitive. ESD protection must be taken into account during repair (ground straps and ESD soldering irons).

RF calibration done via Phoenix software is temperature sensitive because of calibration of 26MHz reference oscillator (VCXO). According to the Helgo specification, the ambient temperature has to be in the range of 22 to 38C.

> **Note:** In this text the following terms are used interchangeably:
>
> - GSM900 = EGSM900 = EGSM
> - GSM1800 = DCS band = PCN band
> - GSM1900 = PCS band

The first step of fault-finding should always be a visual inspection. Carefully inspect the RF area using a microscope and look for solder bridges, missing components, short circuits, components that have partially come off and other anomalies. Capacitors can be checked to see that they are not short-circuited, and inductors that they are not open circuits. Also check that power supply lines are not short-circuited, i.e. not 0Ω to ground.

Instruments needed for troubleshooting (minimum requirement):

- oscilloscope
- multimeter
- spectrum analyzer (SA)

> **Note:** Always use an attenuator at the spectrum analyzer input to ensure that the SA will not become damaged by excessive input power from the phone. Check the spectrum analyzer for maximum allowable input power.
>
> For example, when transmitting in the EGSM band at max power level, the output power will be around +33dBm. By using a 10dB attenuator the actual input to the SA will then be +23dBm. Also adjust the internal attenuator so that the transmitted signal is reduced to less than around -10dBm in order to avoid saturation of SA input stage.

- power supply that can deliver at least 2Adc
- Nokia MJ-30 module jig (also called test jig)
- RF adapter SA-38
- PC with Phoenix installed
- PKD-1 deskey dongle for Phoenix

RF key components

The following figure shows the key components of the RF section:

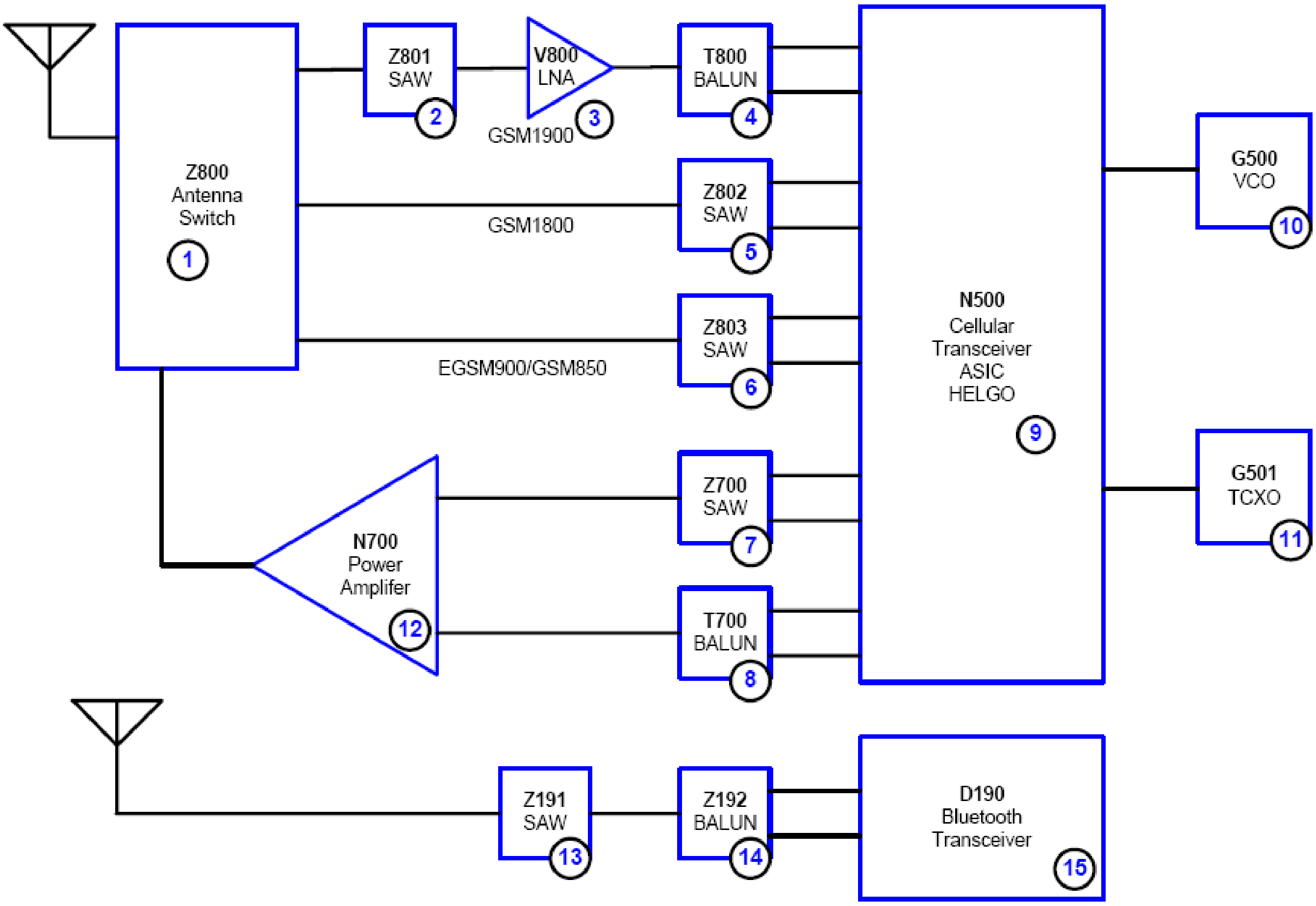

Z800
Antenna
Switch
1
Z801
SAW
2
V800
LNA
3
GSM1900
T800
BALUN
4
GSM1800
Z802
SAW
5
EGSM900/GSM850
Z803
SAW
6
Z700
SAW
7
T700
BALUN
8
N500
Cellular
Transceiver
ASIC
HELGO
9
G500
VCO
10
G501
TCXO
11
N700
Power
Amplifer
12
Z191
SAW
13
Z192
BALUN
14
D190
Bluetooth
Transceiver
15

Figure 118 RF key components

- Adjust the RX chain after repairing or changing the parts marked RX.
- Adjust the TX chain after repairing or changing the parts marked TX.
- The numbering refers to the RF-overview and non-RF-overview pictures.

Table 7 RF retuning after changing a component

No	Ref	Name	Used by	
1	N500	Helgo RF ASIC	RX	TX
2	G500	VCO	RX	TX
3	G501	VCTCXO	RX	
4	Z800	RX/TX Switch	RX	TX
5	N700	PA		TX
6	V800	LNA1900	RX	
7	Z803	RX SAW 900	RX	
8	Z802	RX SAW 1800	RX	
9	Z801	RX SAW 1900	RX	
10	T800	RX Balun 1900	RX	
11	Z700	TX SAW 900		TX

No	Ref	Name		Used by
12	T700	TX Balun 1800/1900		TX

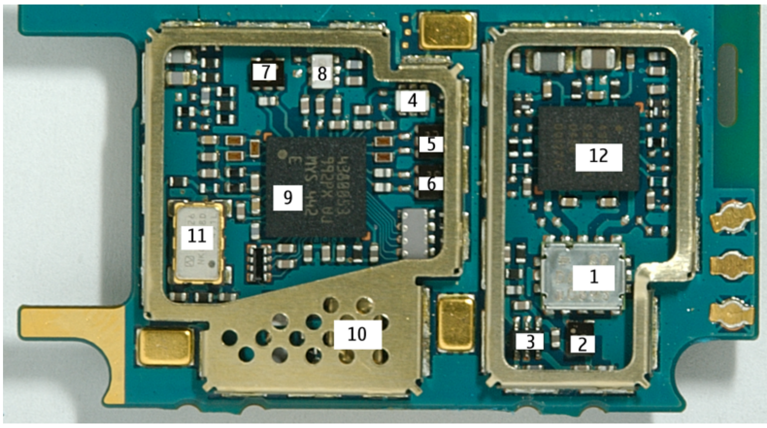

7
8
4
5
6
9
11
10
12
1
3
2

Figure 119 RF key components (left)

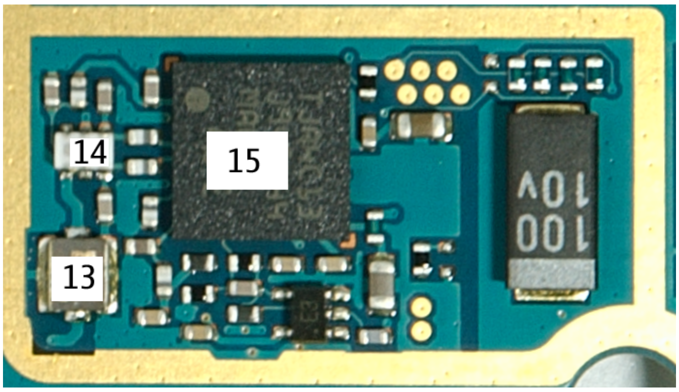


Figure 120 RF key components (right)

Receiver

Receiver troubleshooting

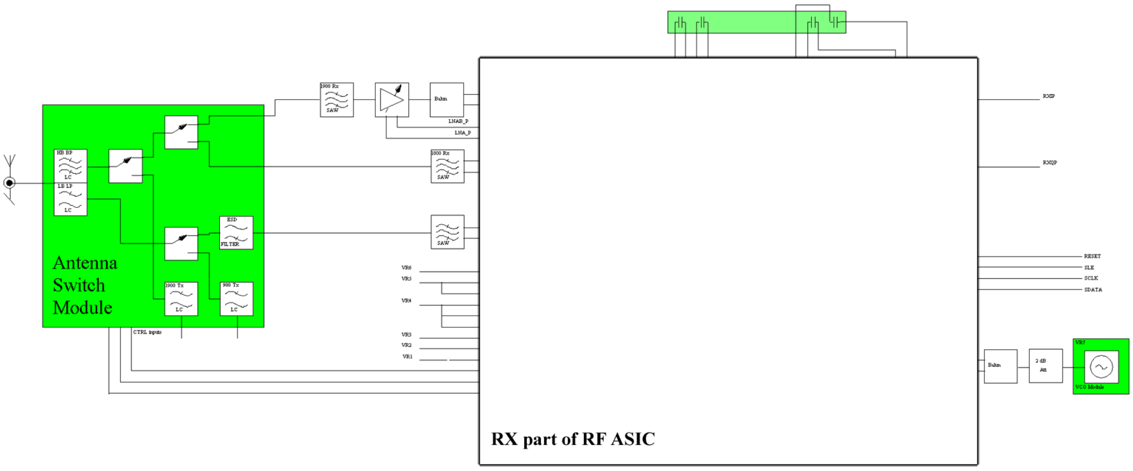

HB BP
LC
LB LP
LC
Antenna
Switch
Module
ESD
FILTER
1900 Tx
LC
900 Tx
LC
CTRL inputs
1900 Rx
SAW
Balun
LNAB_P
LNA_P
1800 Rx
SAW
SAW
VR6
VR5
VR4
VR3
VR2
VR1
RX part of RF ASIC
RXIP
RXQP
RESET
SLE
SCLK
SDATA
Balun
2 dB
Att
VR7
VCO Module

Figure 121 Receiver signal paths

Each receiver path is a direct conversion linear receiver. From the antenna, the received RF signal is fed to a front end module where a diplexer first divides the signal to two separate paths according to the band of operation: either lower, EGSM900 or upper, GSM1800/1900 path.

At each of the paths follows a pin-diode switch, which is used to select either a receive- or transmit mode. At the upper band in the receive mode either GSM1800 or 1900 path is further selected by another pin-diode switch. The selections are controlled by Helgo, which obtains the mode/band and timing information through the RFBus.

After the switches an external bandpass filter follows each receiver paths. Thereafter, the signal is fed to the LNA's. EGSM900 and GSM1800 LNA's are integrated in Helgo, while the GSM1900 LNA is a discrete component placed between SAW filter and balun. In GSM1900, the amplified signal is fed to a pre-gain stage of the mixer. EGSM900 and GSM1800 LNA's are connected directly to the pregain stages. The pregain stages as well as all the following receiver blocks are integrated in Helgo. The LNA's have three gain levels. The first one is the maximum gain, the second one is about 30 dB below the maximum, and the last one is the off state.

After the pregain stages there are demodulator mixers at each signal path to convert the RF signal directly down to baseband I and Q signals. Local oscillator signals for the mixers are generated by an external VCO. The frequency is divided by two in GSM1800 and GSM1900 and by four in EGSM900. Those frequency dividers are integrated in Helgo and in addition to the division they also provide accurate phase shifting by 90 degrees which is needed for the demodulator mixers.

The demodulator output signals are all differential. After the demodulators there are amplifiers called DtoS (differential to single ended) which convert the differential signals to single ended. Before that, they combine the signals from the three demodulators to a single path which means that from the output of the demodulators to the baseband interface are just two signal paths (I and Q), which are common to all the frequency bands of operation. In addition, the DtoS amplifiers perform the first part of the channel filtering and AGC (automatic gain control). They have two gain stages, the first one with a constant gain of 12 dB and -3 dB bandwidth of 85 kHz and the second one with a switchable gain of ±6 dB. The filters in the DtoS blocks are active RC filters. The rest of the analog channel filtering is provided by blocks called BIQUAD which include modified Sallen-Key biquad filters.

After the DtoS and BIQUAD blocks, there is another AGC-amplifier which provides a gain control range of 42 dB in 6 dB steps. The correlation between the gain steps and the absolute received power levels is found by a calibration routine in the production for each assembled phone.

In addition to the AGC steps, the last AGC stage also performs the real time DC offset compensation, which is needed in a direct conversion receiver to cancel out the effect of the local oscillator leakage. DC offset compensation is performed during an operation called DCN1. DCN1 is carried out by charging capacitors at the input of the last AGC stages to a voltage, which causes a zero DC offset. To improve the accuracy a DC level alignment possibility has been added to Helgo.

After the last AGC stages the single ended and filtered I- and Q-signals are fed to the RX ADCs. The maximum peak-to-peak voltage swing for the ADCs is 1.45 V.

Measuring Rx/IQ signals using RSSI

Context

Steps

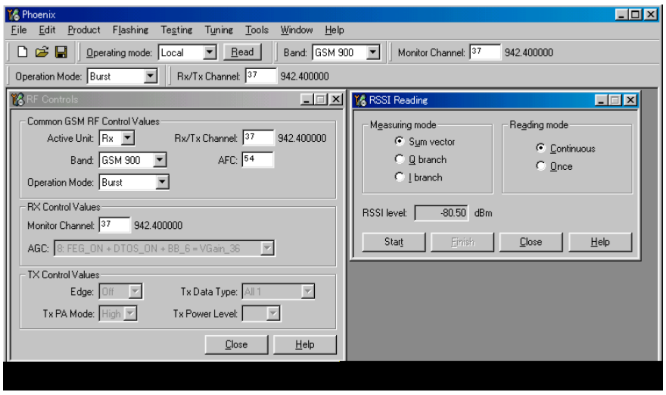
1. Start Phoenix service software.
2. Establish a connection to the phone.

   From the File menu, choose "Open Product".

   From the list, select RM-51.
3. From the Testing menu, choose RF Controls.

4. In the RF Controls window:
    - Select Band: GSM900/GSM1800/GSM1900.
    - Set Active unit to Rx.
    - Set Operation mode to Burst.
    - Set Rx/Tx channel in the following way: EGSM900: 37, GSM1800: 700 and GSM1900:661.
5. From the Testing menu, choose RSSI Reading.

   The setup now looks like this:


Phoenix
File
Edit
Product
Flashing
Testing
Tuning
Tools
Window
Help
Read
RF Controls
Common GSM RF Control Values
RX Control Values
TX Control Values
Close
Help
RSSI Reading
Measuring mode
Reading mode
Start
Finish
Close
Help

Operating mode: Local
Band: GSM 900
Monitor Channel: 37 942.400000
Operation Mode: Burst
Rx/Tx Channel: 37 942.400000

Active Unit: Rx
Rx/Tx Channel: 37 942.400000
Band: GSM 900
AFC: 54
Operation Mode: Burst
Monitor Channel: 37 942.400000
AGC: 8: FEG_ON + DTOS_ON + BB_6 = VGain_36
Edge: Off
Tx Data Type: All 1
Tx PA Mode: High
Tx Power Level:

● Sum vector
○ Q branch
○ I branch
● Continuous
○ Once
RSSI level: -80.50 dBm

6. Apply a signal frequency of -80dBm at:
    - EGSM900: 942.4677MHz (channel 37 + 67.7KHz offset)
    - GSM1800: 1842.8677MHz (channel 700 + 67.7KHz offset)
    - GSM1900: 1960.0677MHz (channel 661 + 67.7 KHz)
7. In RSSI reading, click Read now.

Results

The resulting RSSI level should be -80dBm in each band.

Measuring RX performance using SNR measurement

Context

Note: This measurement also provides an indication of the conducted sensitivity.

Steps

1. Start Phoenix Service Software
2. Establish connection to the phone.

   From the File menu, choose "Open Product".

   From the list, select RM-51.
3. From the Testing menu, choose RF Controls.
4. In the RF Controls window:

   i Select Band: GSM900/GSM1800/GSM1900
   ii Set Active unit to RX.
   iii Set Operation mode to Burst
   iv Set Rx/Tx channel in the following way: EGSM900: 37, GSM1800: 700 and GSM1900: 661
5. From the testing menu (T) select SNR measurement (M). Then select Both.

6. Choose respective band, EGSM900, GSM1800 or GSM1900.

   Press Start.
7. Follow the instructions for Signal generator set-up in the pop-up window.

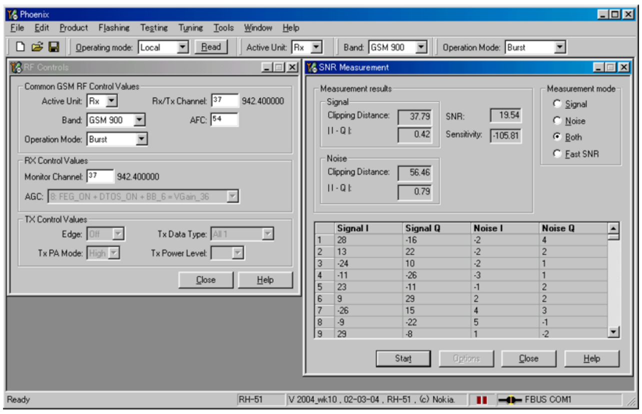
   Press OK.

Results

Read the SNR result. SNR should be > 18dB.

Check the sensitivity value.

The set-up should now look like this (the pop-up window also included in the picture for reference):



Operating mode: Local
Active Unit: Rx
Band: GSM 900
Operation Mode: Burst

Common GSM RF Control Values
Active Unit: Rx
Rx/Tx Channel: 37 942.400000
Band: GSM 900
AFC: 54
Operation Mode: Burst

RX Control Values
Monitor Channel: 37 942.400000
AGC: 8: FEG_ON + DTOS_ON + BB_6 = VGain_36

TX Control Values
Edge: Off
Tx Data Type: All 1
Tx PA Mode: High
Tx Power Level:

Measurement results
Signal
Clipping Distance: 37.79
| I - Q |: 0.42
SNR: 19.54
Sensitivity: -105.81
Noise
Clipping Distance: 56.46
| I - Q |: 0.79

Measurement mode
○ Signal
○ Noise
● Both
○ Fast SNR

	Signal I	Signal Q	Noise I	Noise Q
1	28	-16	-2	4
2	13	22	-2	2
3	-24	10	-2	1
4	-11	-26	-3	1
5	23	-11	-1	2
6	9	29	2	2
7	-26	15	4	3
8	-9	-22	5	-1
9	29	-8	1	-2

RH-51
V 2004_wk10 , 02-03-04 , RH-51 , (c) Nokia.
FBUS COM1

Measuring Rx module manually using oscilloscope and spectrum analyzer (EGSM900)

Context

Spectrum analyzer level values depend on the probe type and should be validated using a known good sample. The levels that are given here are measured using a high frequency probe.

Measuring with an oscilloscope at test points RXI (J730) or RXQ (J731)) and RXID (J261) or RXQD (J262) is recommended only if RSSI reading does not provide enough information.

Steps

1. Start Phoenix Service software.
2. Establish connection to the phone.

   From the File menu, choose Open Product.

   From the list, choose RM-51.
3. From the Testing menu, choose RF Controls.
4. In the RF Controls window:
   - i Select Band EGSM900.
   - ii Set Active unit to RX.
   - iii Set Operation mode to Continuous.
   - iv Set RX/TX channel to 37.
   - v Set AGC to 12.

     Set the frequency and level of the signal generator to 942.4677MHz and -60dBm.

     Note: Because DC compensation does not work during continuous mode, DC offset level at RXI and RXQ will gradually shift from the optimized level.

To have the most reliable result, it is highly advisable to set the operation mode from burst to continuous just before measuring values and complete measurement within no longer than 30 seconds.

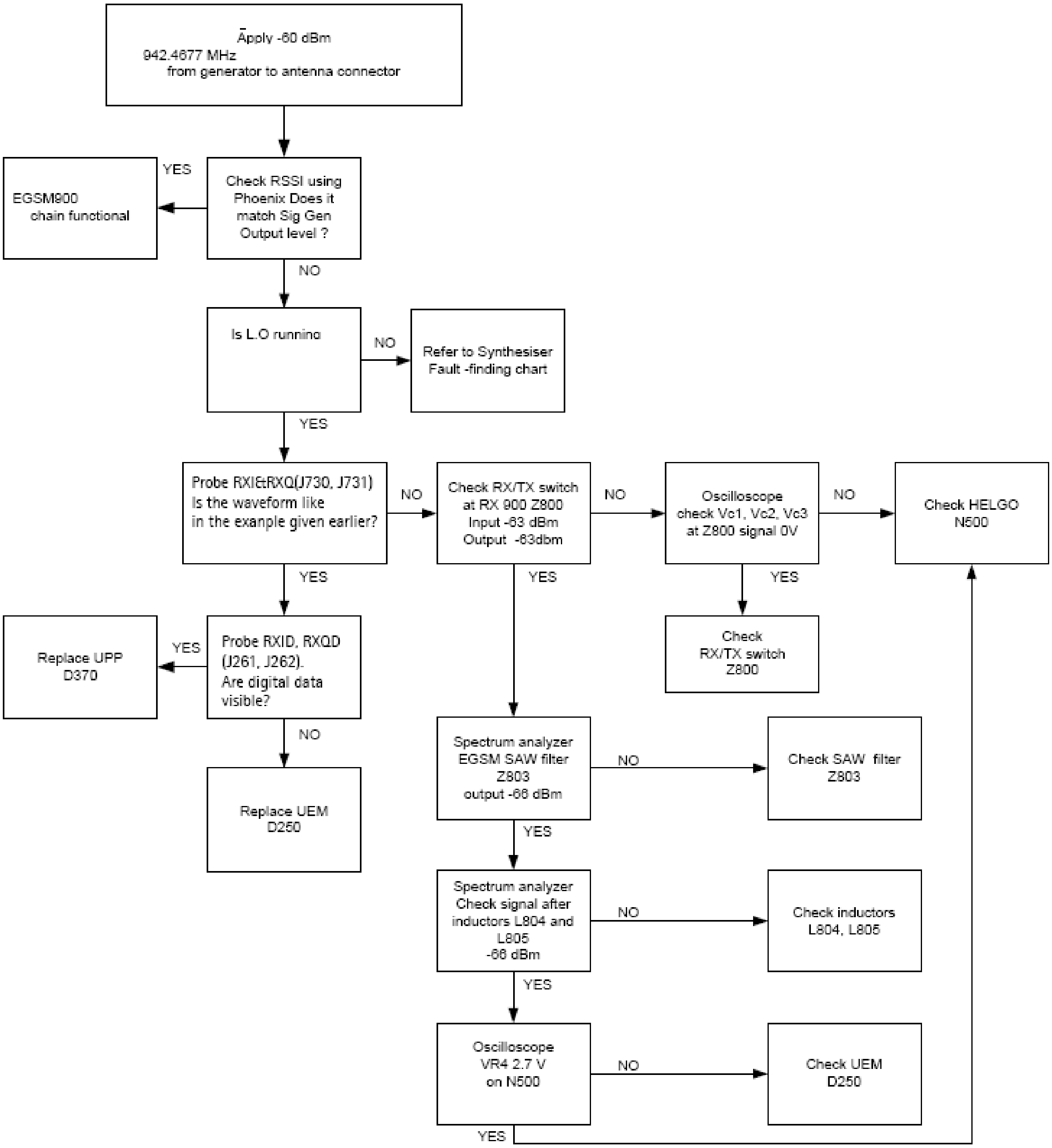
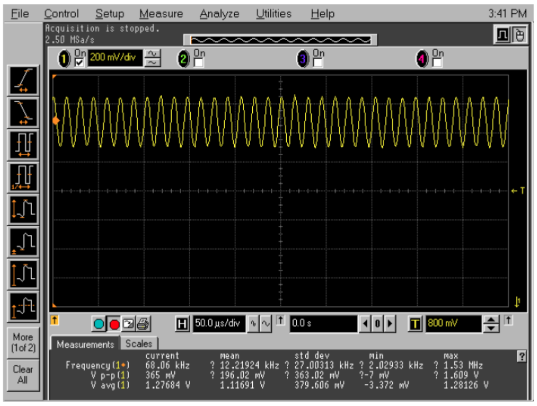

Apply -60 dBm
942.4677 MHz
from generator to antenna connector
Check RSSI using Phoenix Does it match Sig Gen Output level ?
YES
EGSM900 chain functional
NO
Is L.O running
NO
Refer to Synthesiser Fault -finding chart
YES
Probe RXI&RXQ(J730, J731) Is the waveform like in the exanple given earlier?
NO
Check RX/TX switch at RX 900 Z800 Input -63 dBm Output -63dbm
NO
Oscilloscope check Vc1, Vc2, Vc3 at Z800 signal 0V
NO
Check HELGO N500
YES
Check RX/TX switch Z800
YES
Probe RXID, RXQD (J261, J262). Are digital data visible?
YES
Replace UPP D370
NO
Replace UEM D250
YES
Spectrum analyzer EGSM SAW filter Z803 output -66 dBm
NO
Check SAW filter Z803
YES
Spectrum analyzer Check signal after inductors L804 and L805 -66 dBm
NO
Check inductors L804, L805
YES
Oscilloscope VR4 2.7 V on N500
NO
Check UEM D250
YES

Figure 122 Troubleshooting flowchart for EGSM900



```
Acquisition is stopped.
2.50 MSa/s
```

```
                   current       mean             std dev          min              max
Frequency(1•)    68.06 kHz   ? 12.21924 kHz ? 27.00313 kHz ? 2.02933 kHz   ? 1.53 MHz
     V p-p(1)    365 mV      ? 196.02 mV    ? 363.02 mV    ?-7 mV          ? 1.609 V
     V avg(1)    1.27684 V     1.11691 V      379.606 mV     -3.372 mV       1.28126 V
```

Figure 123 Probed Rx I/Q signals J730, J731

- Signal amplitude: 180 ~ 600mVpp
- DC offset: 1.2 ~ 1.4V
- Frequency: approximately 67KHz

Measuring Rx module manually using oscilloscope and spectrum analyzer (GSM1800)

Context

Spectrum analyzer level values depend on the probe type and should be validated using a known good sample. The levels that are given here are measured using a high frequency probe.

Measuring with an oscilloscope at test points RXI (730) or RXQ (J731)) and RXID (J261) or RXQD (J262) is recommended only if RSSI reading does not provide enough information.

Steps

1. Start Phoenix Service software.
2. Establish connection to the phone.

   From the File menu, choose Open Product.

   From the list, choose RM-51.
3. From the Testing menu, choose RF Controls.
4. In the RF Controls window:
   - i Select Band GSM1800.
   - ii Set Active unit to Rx.
   - iii Set Operation mode to Continuous.
   - iv Set RX/TX channel to 700.
   - v Set AGC to 12.

     The frequency or level of signal generator is 1842.8677MHz, -60dBm.

     Note: Because DC compensation does not work during continuous mode, DC offset level at RXI and RXQ will gradually shift from the optimized level.

     To have the most reliable result, it is highly advisable to set the operation mode from burst to continuous just before measuring values and complete measurement within no longer than 30 seconds.

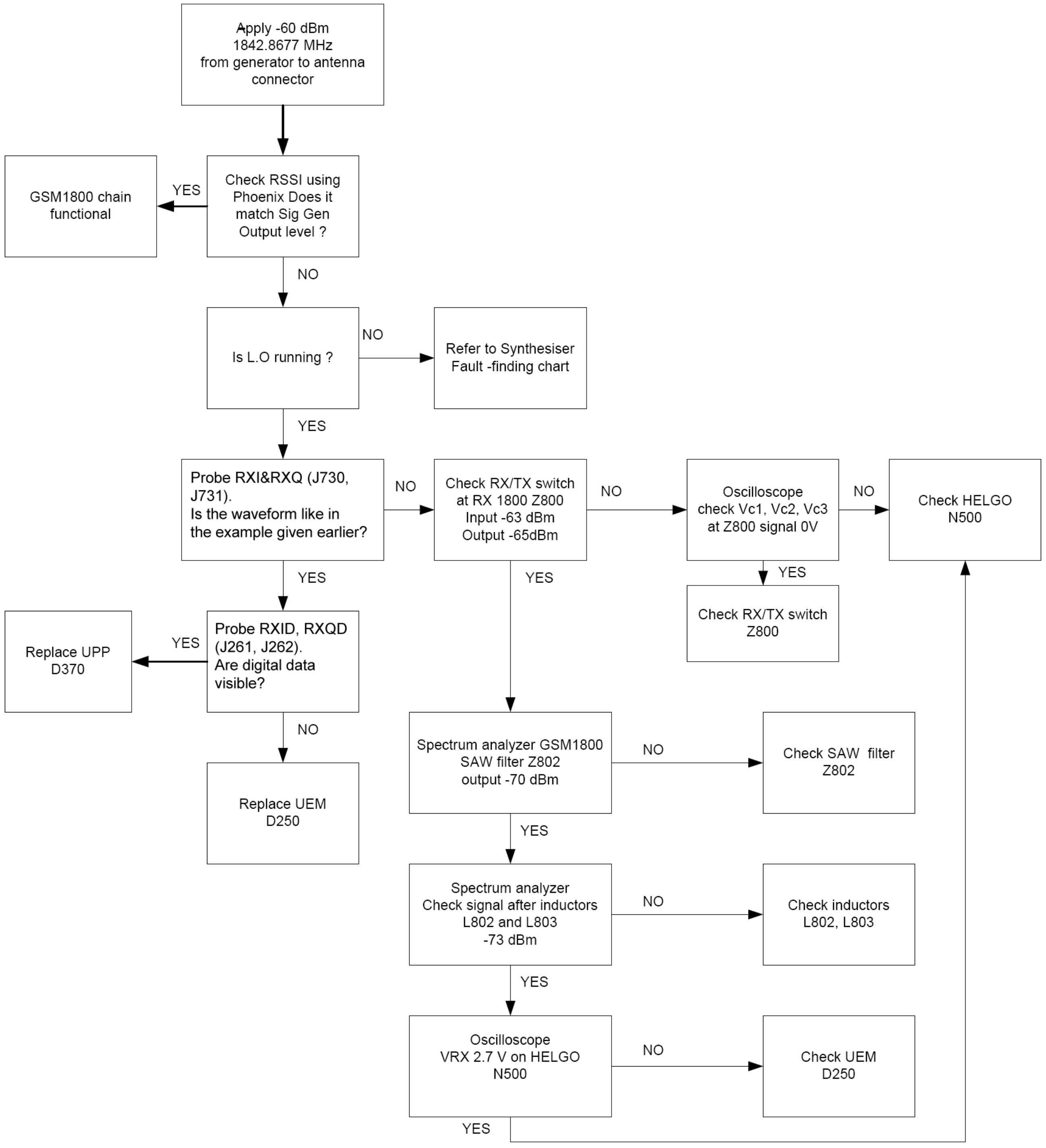

Apply -60 dBm 1842.8677 MHz from generator to antenna connector
Check RSSI using Phoenix Does it match Sig Gen Output level ?
YES
GSM1800 chain functional
NO
Is L.O running ?
NO
Refer to Synthesiser Fault -finding chart
YES
Probe RXI&RXQ (J730, J731). Is the waveform like in the example given earlier?
NO
Check RX/TX switch at RX 1800 Z800 Input -63 dBm Output -65dBm
NO
Oscilloscope check Vc1, Vc2, Vc3 at Z800 signal 0V
NO
Check HELGO N500
YES
Check RX/TX switch Z800
YES
Probe RXID, RXQD (J261, J262). Are digital data visible?
YES
Replace UPP D370
NO
Replace UEM D250
YES
Spectrum analyzer GSM1800 SAW filter Z802 output -70 dBm
NO
Check SAW filter Z802
YES
Spectrum analyzer Check signal after inductors L802 and L803 -73 dBm
NO
Check inductors L802, L803
YES
Oscilloscope VRX 2.7 V on HELGO N500
NO
Check UEM D250
YES

Figure 124 Troubleshooting flowchart for EGSM1800

Measuring Rx module manually using oscilloscope and spectrum analyzer (GSM1900)

Context

Spectrum analyzer level values depend on the probe type and should be validated using a known good sample. The levels that are given here are measured using a high frequency probe.

Measuring with an oscilloscope at test points RXI (J827) or RXQ (J828)) and RXID (J261) or RXQD (J262) is recommended only if RSSI reading does not provide enough information.

Steps

1. Start Phoenix Service software.
2. Establish connection to the phone.

   From the File menu, choose Open Product.

   From the list, choose RM-51.
3. From the Testing menu, choose RF Controls.
4. In the RF Controls window:
   - i Select Band GSM1900.
   - ii Set Active unit to Rx.
   - iii Set Operation mode to Continuous.
   - iv Set RX/TX channel to 661.
   - v Set AGC to 12.

     The frequency or level of signal generator is 1960.0677MHz, -60dBm.

     Note: Because DC compensation does not work during continuous mode, DC offset level at RXI and RXQ will gradually shift from the optimized level.

     To have the most reliable result, it is highly advisable to set the operation mode from burst to continuous just before measuring values and complete measurement within no longer than 30 seconds.

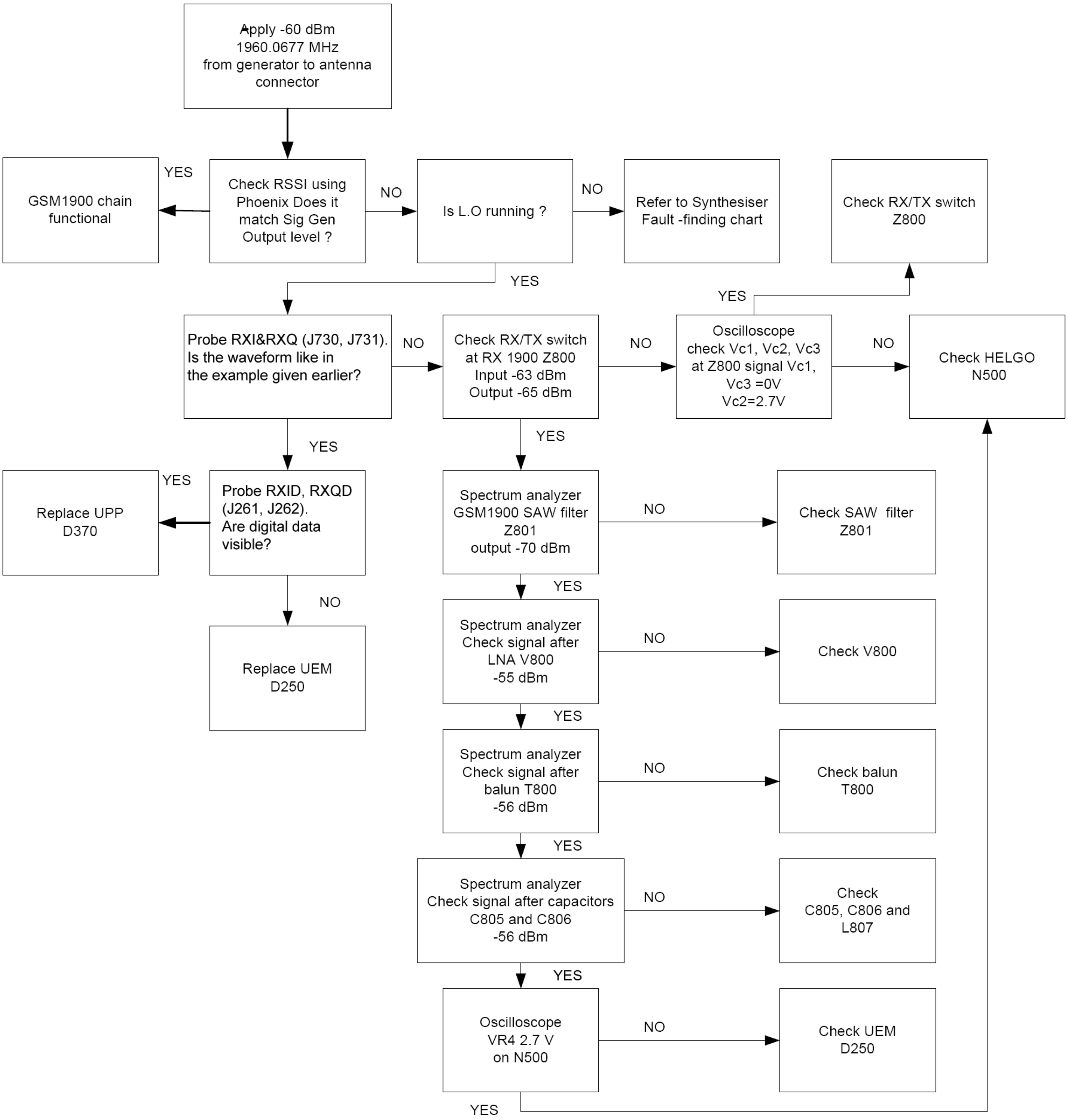

Apply -60 dBm
1960.0677 MHz
from generator to antenna connector
Check RSSI using Phoenix Does it match Sig Gen Output level ?
YES
GSM1900 chain functional
NO
Is L.O running ?
NO
Refer to Synthesiser Fault -finding chart
Check RX/TX switch Z800
YES
YES
Probe RXI&RXQ (J730, J731). Is the waveform like in the example given earlier?
NO
Check RX/TX switch at RX 1900 Z800 Input -63 dBm Output -65 dBm
NO
Oscilloscope check Vc1, Vc2, Vc3 at Z800 signal Vc1, Vc3 =0V Vc2=2.7V
NO
Check HELGO N500
YES
YES
YES
Replace UPP D370
Probe RXID, RXQD (J261, J262). Are digital data visible?
Spectrum analyzer GSM1900 SAW filter Z801 output -70 dBm
NO
Check SAW filter Z801
NO
Replace UEM D250
YES
Spectrum analyzer Check signal after LNA V800 -55 dBm
NO
Check V800
YES
Spectrum analyzer Check signal after balun T800 -56 dBm
NO
Check balun T800
YES
Spectrum analyzer Check signal after capacitors C805 and C806 -56 dBm
NO
Check C805, C806 and L807
YES
Oscilloscope VR4 2.7 V on N500
NO
Check UEM D250
YES

Figure 125 Troubleshooting flowchart for EGSM1900

Measurement points in the receiver

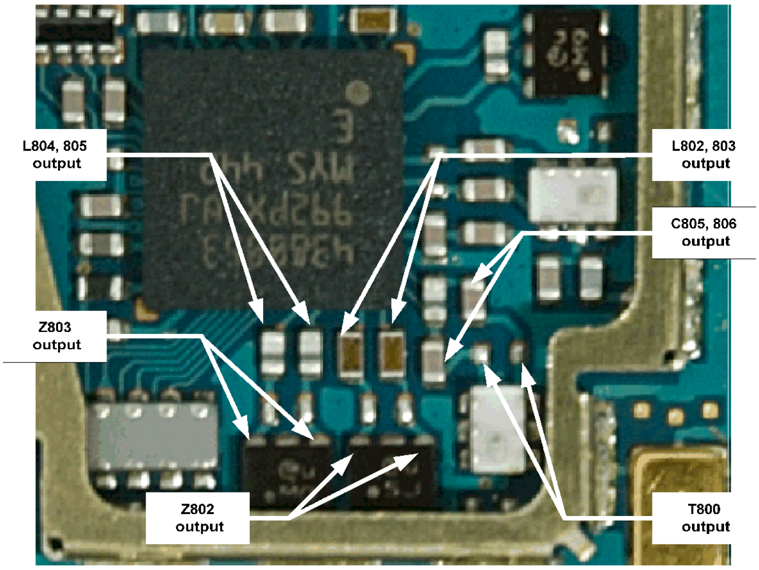

L804, 805
output
L802, 803
output
C805, 806
output
Z803
output
Z802
output
T800
output

Figure 126 Measurement points at RX frontend - part 1

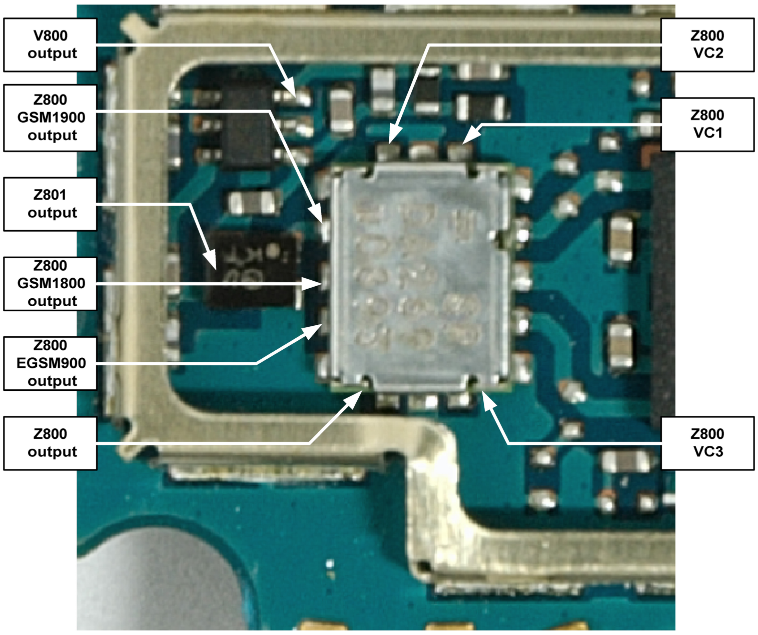

V800
output
Z800
GSM1900
output
Z801
output
Z800
GSM1800
output
Z800
EGSM900
output
Z800
output
Z800
VC2
Z800
VC1
Z800
VC3

Figure 127 Measurement points at RX frontend - part 2

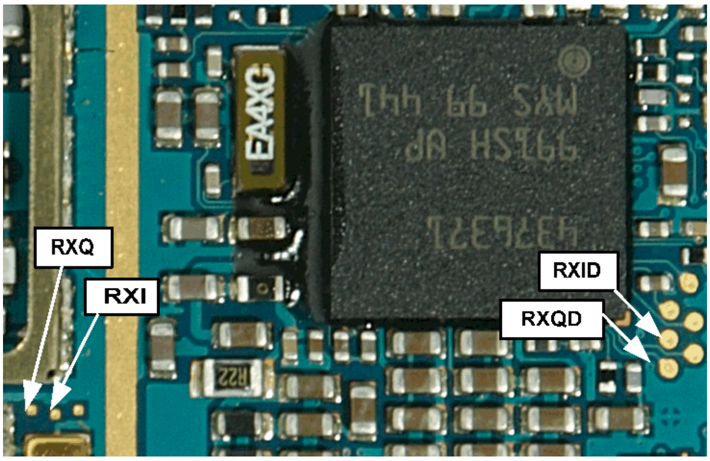

RXQ
RXI
RXID
RXQD

Figure 128 Measurement points at baseband and digital IQs

Calibrating RX

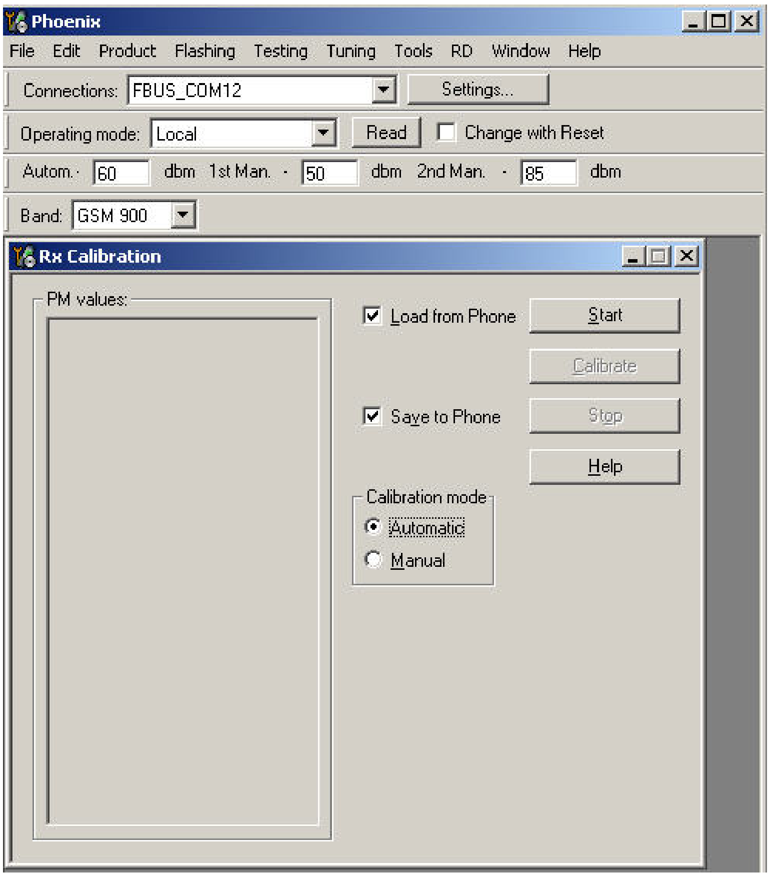
Context

RX calibration is used to determine gain at different gain settings for front-end and the Helgo ASIC and it needs to be done in all three bands.

RX calibration requires an external signal generator.

Steps

1. Select *Tuning -> RX calibration*


Phoenix
File
Edit
Product
Flashing
Testing
Tuning
Tools
RD
Window
Help
Settings...
Read
Rx Calibration
Start
Calibrate
Stop
Help

Connections: FBUS_COM12

Operating mode: Local

☐ Change with Reset

Autom. - 60 dbm 1st Man. - 50 dbm 2nd Man. - 85 dbm

Band: GSM 900

PM values:

☑ Load from Phone

☑ Save to Phone

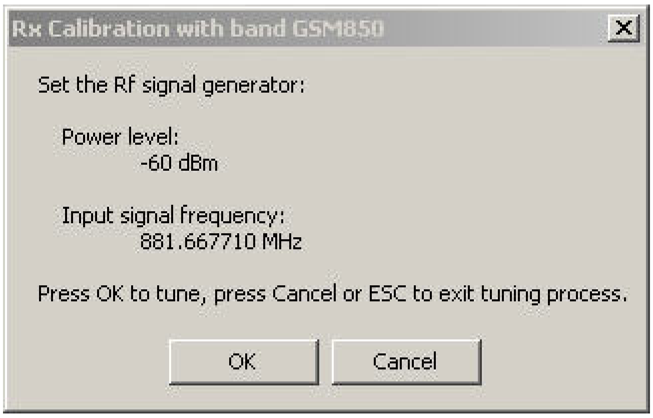
Calibration mode
● Automatic
○ Manual

Figure 129 RX calibration

i Check Automatic calibration mode.
ii Check load from phone and Save to phone.
iii Press Start

Initial data will be loaded from the phone and calibration starts.

The following banner pops up:



Rx Calibration with band GSM850

Set the Rf signal generator:

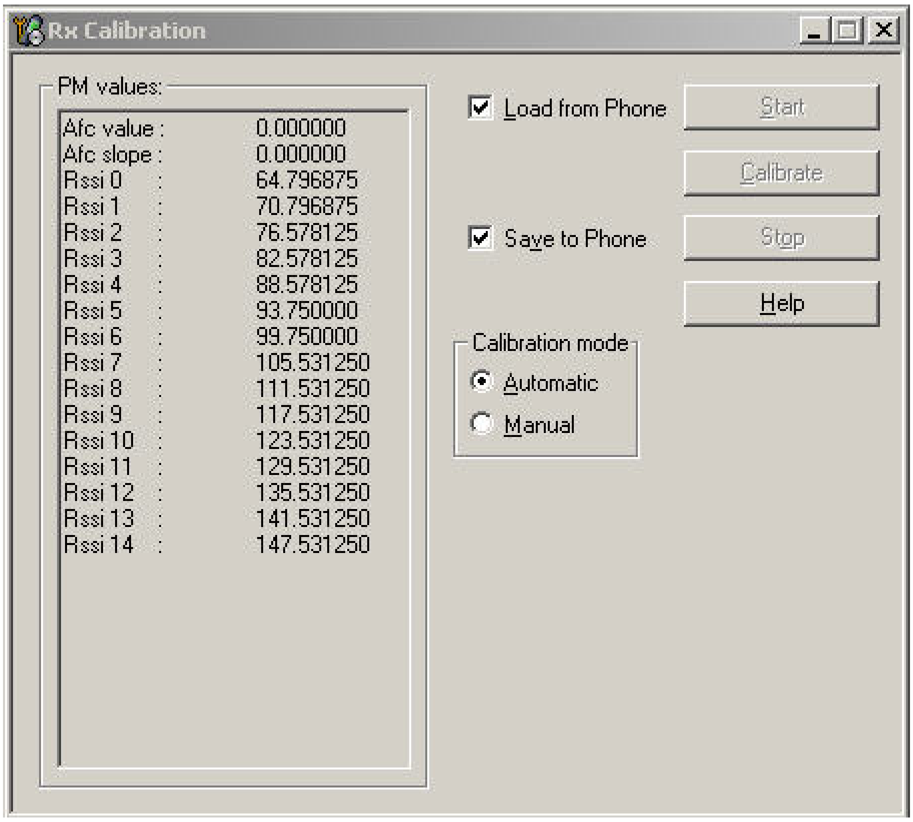
Power level:
-60 dBm

Input signal frequency:
881.667710 MHz

Press OK to tune, press Cancel or ESC to exit tuning process.

Figure 130 RX calibration with band EGSM900

iv Follow the instructions in the pop–up window and set frequency and level of the signal generator.
v Press OK
vi Press “Save & Continue”



Rx Calibration

PM values:

```
Afc value :    0.000000
Afc slope :    0.000000
Rssi 0    :    64.796875
Rssi 1    :    70.796875
Rssi 2    :    76.578125
Rssi 3    :    82.578125
Rssi 4    :    88.578125
Rssi 5    :    93.750000
Rssi 6    :    99.750000
Rssi 7    :    105.531250
Rssi 8    :    111.531250
Rssi 9    :    117.531250
Rssi 10   :    123.531250
Rssi 11   :    129.531250
Rssi 12   :    135.531250
Rssi 13   :    141.531250
Rssi 14   :    147.531250
```

☑ Load from Phone
☑ Save to Phone

Calibration mode
● Automatic
○ Manual

Figure 131 RX calibration values

Results

Calibration data will be stored to the phone.

Next action

Continue to next band.

Compensating RX band filter response

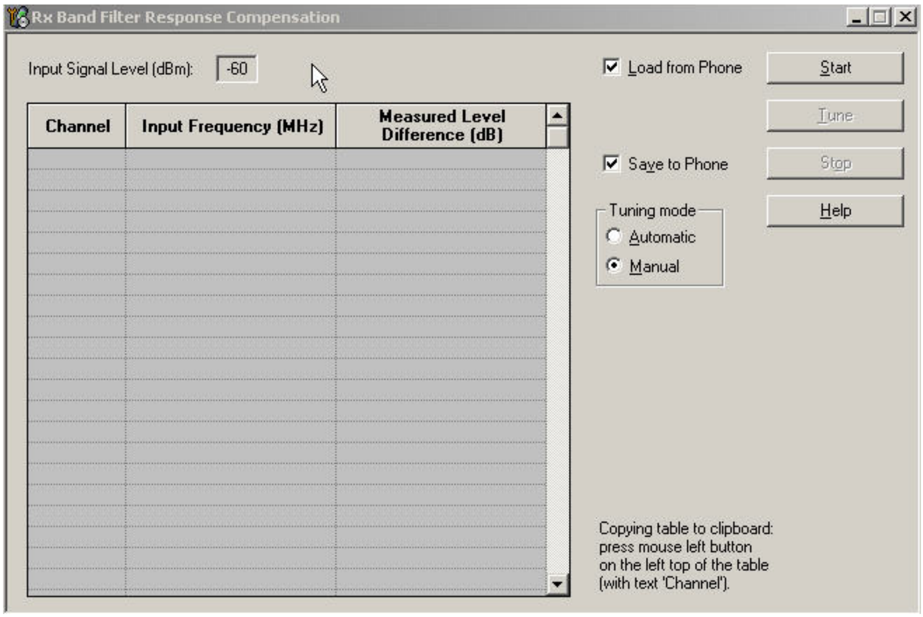
Context

Rx band filter response compensation has 9 steps for each band.

Rx band filter response compensation requires an external signal generator.

Steps

1. Select *Tuning -> RX Band Filter Response Compensation*



Input Signal Level (dBm): -60

Channel	Input Frequency (MHz)	Measured Level Difference (dB)

☑ Load from Phone

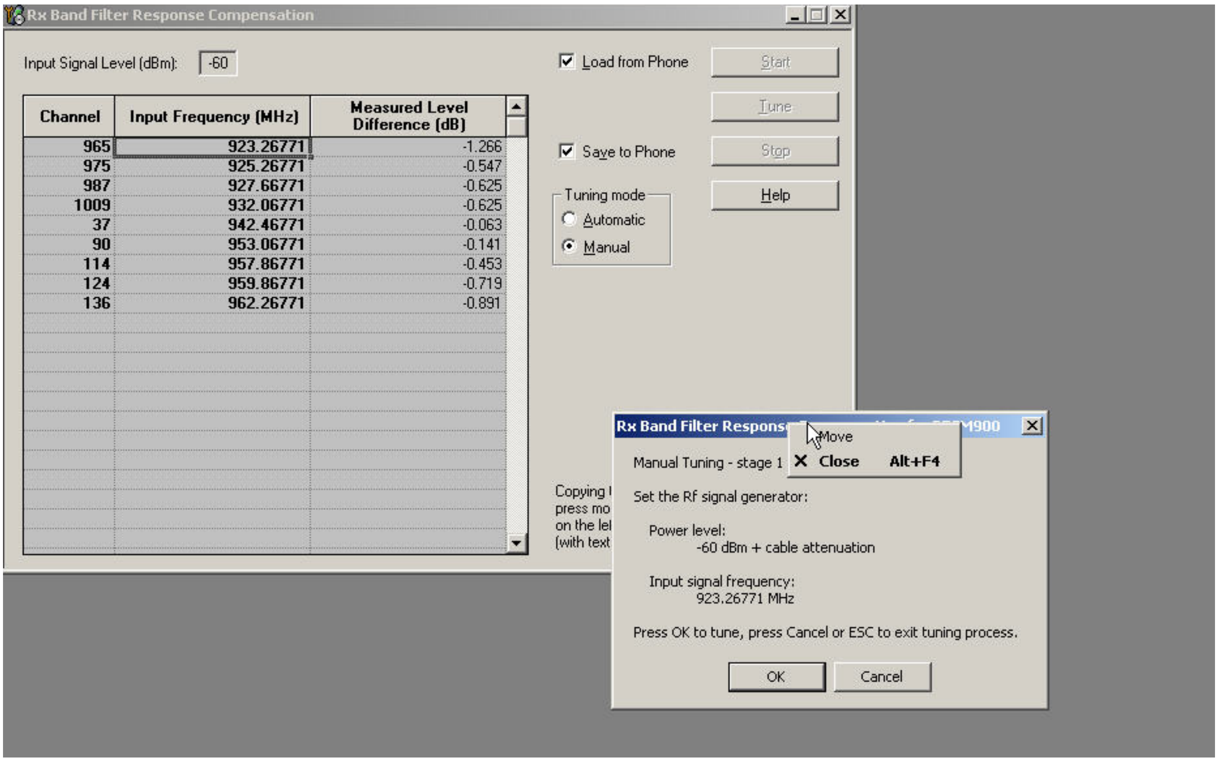
☑ Save to Phone

Tuning mode
○ Automatic
● Manual

Copying table to clipboard: press mouse left button on the left top of the table (with text 'Channel').

Figure 132 RX band filter response compensation

- i Select Manual Tuning mode
- ii Press Start.
- iii Initial data will be loaded from the phone.
- iv Press tune to start calibration.
- v Follow the instructions given in the following pop–up window and set frequency and level of the signal generator.


Rx Band Filter Response Compensation
Start
Tune
Stop
Help
Copying
press mo
on the lel
(with text
Rx Band Filter Respons
M900
Move
Close
Alt+F4
OK
Cancel

Input Signal Level (dBm): -60

☑ Load from Phone

☑ Save to Phone

Tuning mode
○ Automatic
● Manual

Channel	Input Frequency (MHz)	Measured Level Difference (dB)
965	923.26771	-1.266
975	925.26771	-0.547
987	927.66771	-0.625
1009	932.06771	-0.625
37	942.46771	-0.063
90	953.06771	-0.141
114	957.86771	-0.453
124	959.86771	-0.719
136	962.26771	-0.891

Manual Tuning - stage 1

Set the Rf signal generator:

Power level:
-60 dBm + cable attenuation

Input signal frequency:
923.26771 MHz

Press OK to tune, press Cancel or ESC to exit tuning process.

Figure 133 RX band filter response compensation for EGSM900

vi Press OK to proceed to the next step.

Results

After completing the steps you have calibrated the phone at 9 frequencies.

Next action

Test will be repeated for other bands.

Calibrating RX Channel Select Filter

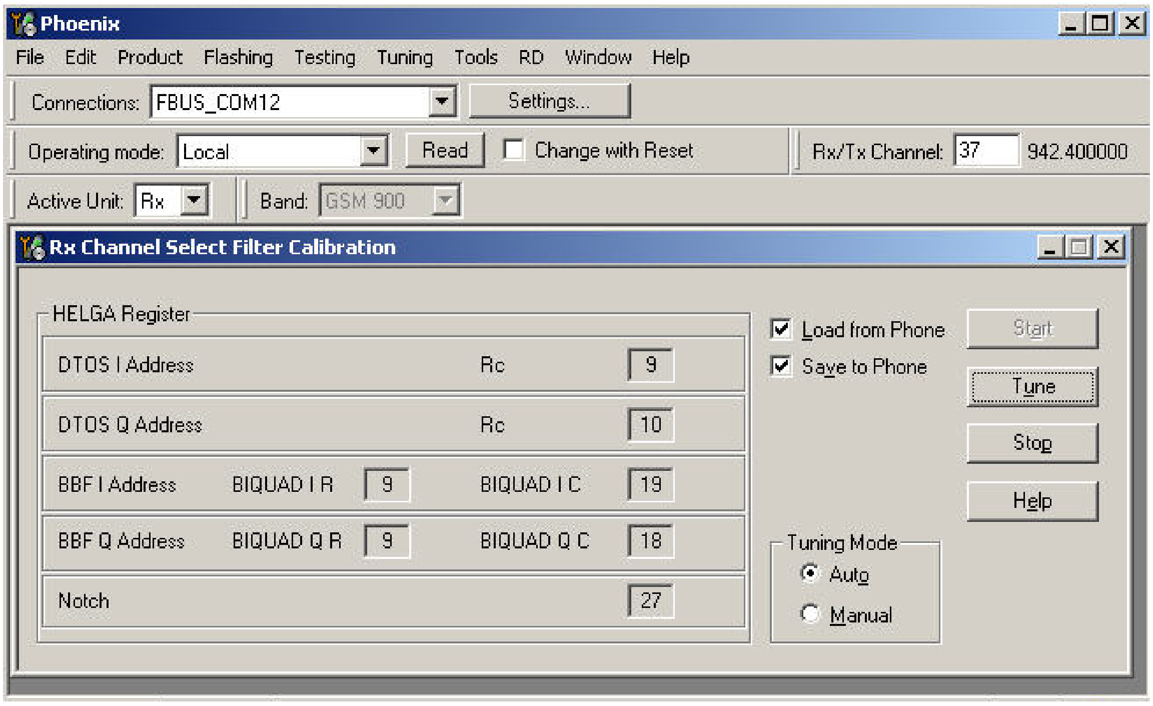
Context

This calibration is for the baseband filter inside Helgo ASIC. The calibration is done by internally measuring a prototype filter. For this reason, the calibration is done only once, not separately for 3 bands.

This tuning doesn't require RF input from an external signal generator.

Steps

1. Select *Tuning -> RX Channel Select Filter Calibration*


Phoenix
File
Edit
Product
Flashing
Testing
Tuning
Tools
RD
Window
Help
Settings...
Read
Rx Channel Select Filter Calibration
Start
Tune
Stop
Help

Connections: FBUS_COM12
Operating mode: Local
☐ Change with Reset
Rx/Tx Channel: 37 942.400000
Active Unit: Rx
Band: GSM 900

HELGA Register

DTOS I Address			Rc	9
DTOS Q Address			Rc	10
BBF I Address	BIQUAD I R	9	BIQUAD I C	19
BBF Q Address	BIQUAD Q R	9	BIQUAD Q C	18
Notch				27

☑ Load from Phone
☑ Save to Phone

Tuning Mode
● Auto
○ Manual

Figure 134 RX Channel Select Filter Calibration

- i Check *Save to Phone*
- ii Press *Tune*
- iii Press *Stop* to store the data to the phone

Results

RX channel select filter calibration is finished.

Transmitter

Introduction to transmitter troubleshooting

A simple block diagram of the TX part of the phone is shown in the following figure. The voice or data signals to be transmitted come from the UEMEK IC in the BB (baseband) area, and go to the Helgo IC, where they are up-converted to RF. The TX signals going from UEMEK to Helgo are called the IQ-signals, and consist of two balanced signals {TXIN, TXIP} and {TXQN, TXQP}, i.e. a total of four signal lines. In addition to the IQ signals, there are also control signals going between BB and RF.

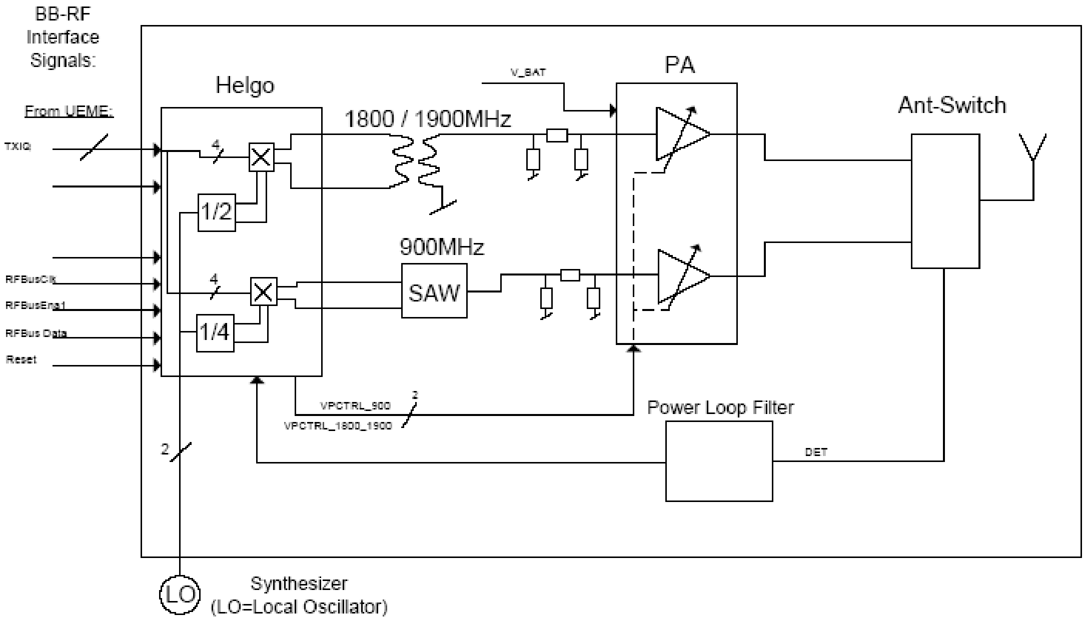

BB-RF Interface Signals:
From UEME:
TXIQ
RFBusClk
RFBusEna1
RFBus Data
Reset
Helgo
4
4
1/2
1/4
1800 / 1900MHz
900MHz
SAW
V_BAT
PA
Ant-Switch
VPCTRL_900
VPCTRL_1800_1900
2
2
Power Loop Filter
DET
LO
Synthesizer
(LO=Local Oscillator)

Figure 135 TX RF block diagram

The following picture shows the two shielding cans where the TX circuitry is located (the lids have been removed). The upper shielding can contains BB-RF interface circuitry, the Helgo RF system IC, a SAW filter for the GSM/EGSM band, and a balun for the DCS/PCS band. The lower shielding can contains the power amplifier (PA) and the antenna switch module (ASM).

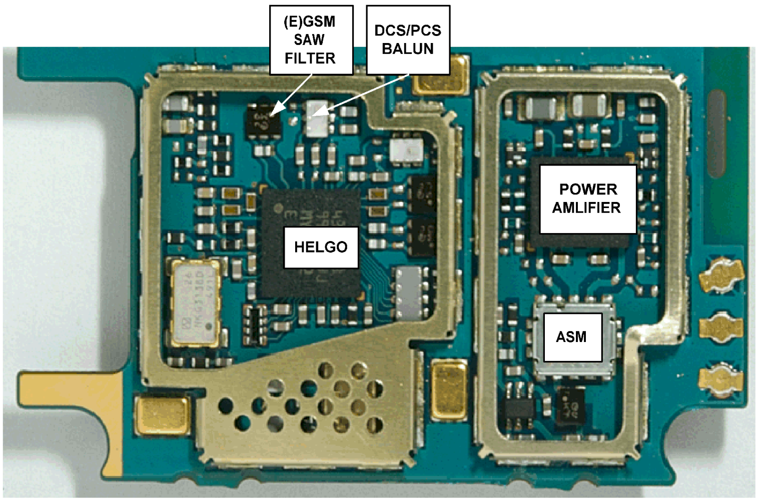

(E)GSM SAW FILTER
DCS/PCS BALUN
HELGO
POWER AMLIFIER
ASM

Figure 136 Shielding cans

Preparing for transmitter troubleshooting

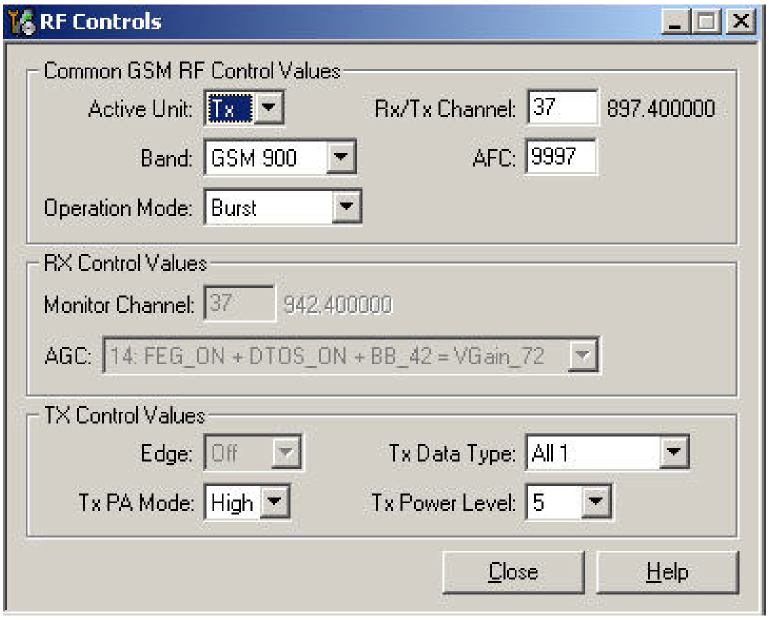
Steps

1. Place the phone (mechanics removed) on module jig.
2. Connect the module jig to PC via a DAU-9P cable.
3. Connect the module jig to a power supply (4.2V).
4. Connect the RF output to a spectrum analyzer or another measurement instrument. Use a 10dB attenuator at the input to spectrum analyzer to avoid damaging it.

5. Make sure the dongle is connected and start Phoenix.
6. In Phoenix, choose: *File -> Open Product -> RM-51 Product Menu*.
7. Select *Testing -> RF Controls*.
8. In the toolbar: set *Operating Mode* to *Local*.
9. Select *Band*: GSM900, GSM1800 or GSM1900.
10. Set *Operation Mode* to *Burst*.
11. Set *Active Unit* to *Tx*.
12. Set *Tx Data Type* to *All 1*.
13. Set *Rx/Tx Channel* to *37* for GSM900, *700* for GSM1800, or *661* for GSM1900.
14. Set *Tx PA Mode* to *Free*.
15. Set *Tx Power Level* to *5* for GSM900, otherwise to *0*.

Results

Phoenix should now look like this:



RF Controls

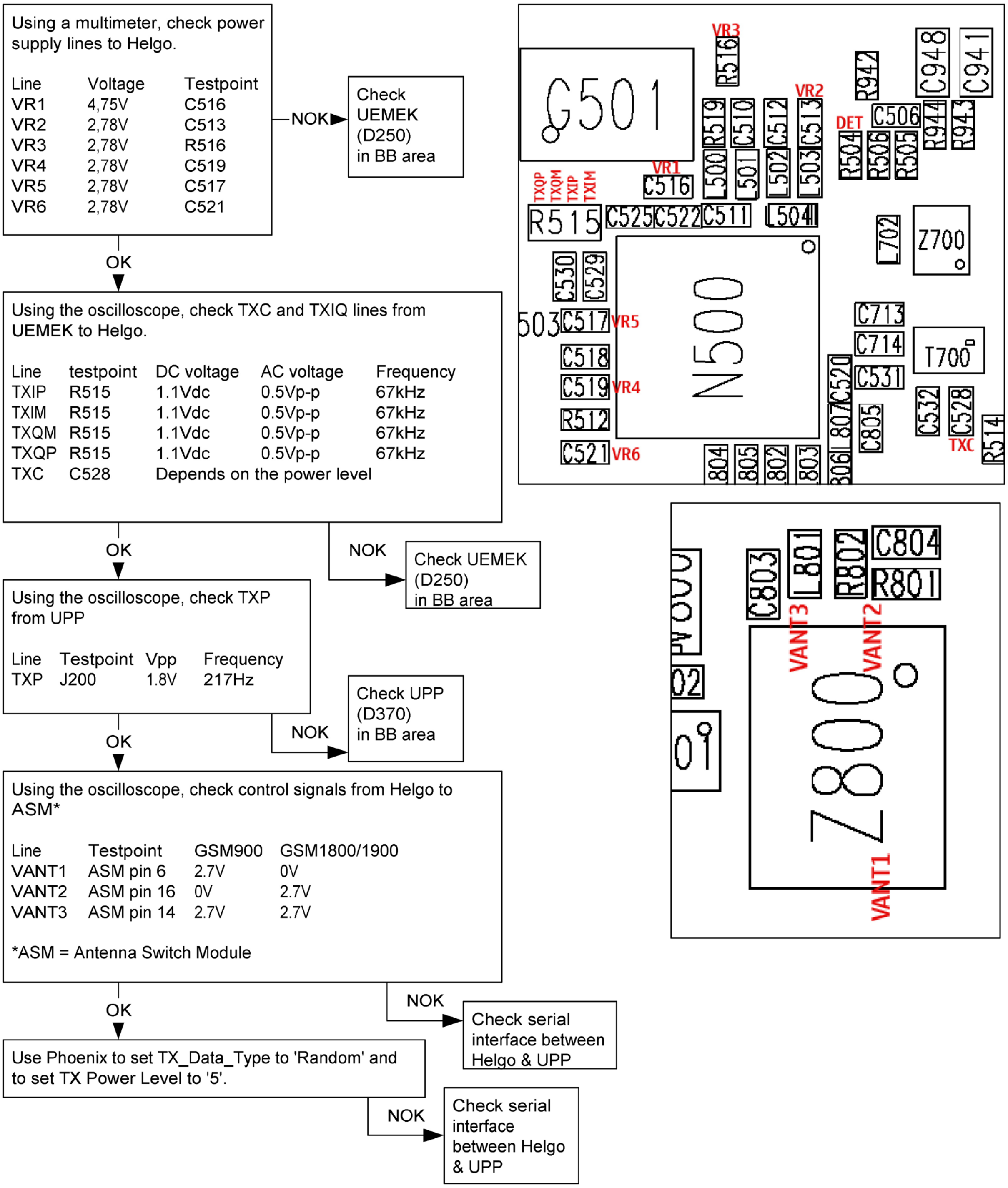
Common GSM RF Control Values
Active Unit: Tx
Rx/Tx Channel: 37 897.400000
Band: GSM 900
AFC: 9997
Operation Mode: Burst

RX Control Values
Monitor Channel: 37 942.400000
AGC: 14: FEG_ON + DTOS_ON + BB_42 = VGain_72

TX Control Values
Edge: Off
Tx Data Type: All 1
Tx PA Mode: High
Tx Power Level: 5

Figure 137 Preparing for transmitter troubleshooting

Troubleshooting TX-BB interface and control signals


OK
NOK
G501
VR3
R516
VR2
R942
C948
C941
R519
C510
C512
C513
DET
C506
R944
R943
VR1
R504
R506
R505
TXQP
TXQM
TXIP
TXIM
C516
L500
L501
L502
L503
R515
C525
C522
C511
L504
L702
Z700
C530
C529
N500
503
C517
VR5
C713
C714
T700
C518
C519
VR4
C520
C531
R512
L807
C805
C532
C528
TXC
R514
C521
VR6
804
805
802
803
806
C803
L801
R802
C804
R801
VANT3
VANT2
VANT1
Z800
02
01

Using a multimeter, check power supply lines to Helgo.

Line	Voltage	Testpoint
VR1	4,75V	C516
VR2	2,78V	C513
VR3	2,78V	R516
VR4	2,78V	C519
VR5	2,78V	C517
VR6	2,78V	C521

Check UEMEK (D250) in BB area

Using the oscilloscope, check TXC and TXIQ lines from UEMEK to Helgo.

Line	testpoint	DC voltage	AC voltage	Frequency
TXIP	R515	1.1Vdc	0.5Vp-p	67kHz
TXIM	R515	1.1Vdc	0.5Vp-p	67kHz
TXQM	R515	1.1Vdc	0.5Vp-p	67kHz
TXQP	R515	1.1Vdc	0.5Vp-p	67kHz
TXC	C528	Depends on the power level		

Check UEMEK (D250) in BB area

Using the oscilloscope, check TXP from UPP

Line	Testpoint	Vpp	Frequency
TXP	J200	1.8V	217Hz

Check UPP (D370) in BB area

Using the oscilloscope, check control signals from Helgo to ASM*

Line	Testpoint	GSM900	GSM1800/1900
VANT1	ASM pin 6	2.7V	0V
VANT2	ASM pin 16	0V	2.7V
VANT3	ASM pin 14	2.7V	2.7V

*ASM = Antenna Switch Module

Check serial interface between Helgo & UPP

Use Phoenix to set TX_Data_Type to 'Random' and to set TX Power Level to '5'.

Check serial interface between Helgo & UPP

Figure 138 TX-BB interface troubleshooting and control signals

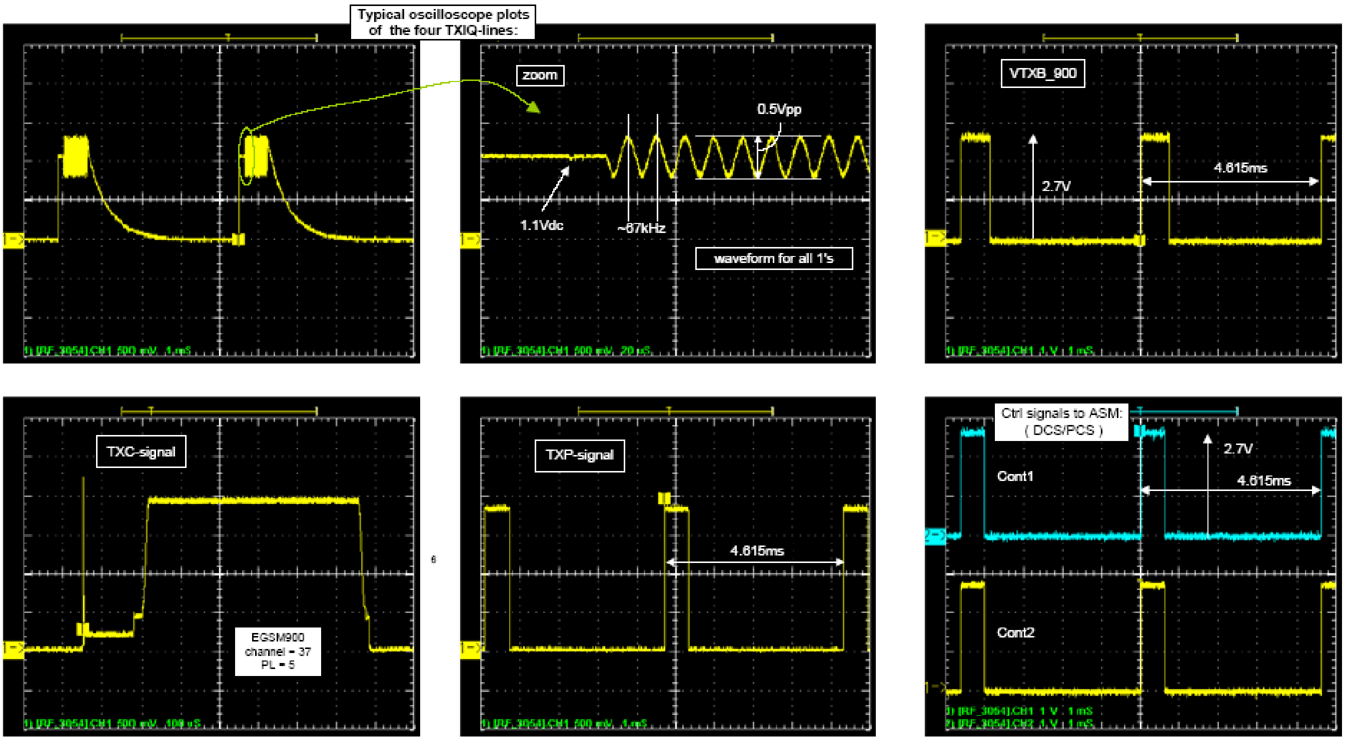
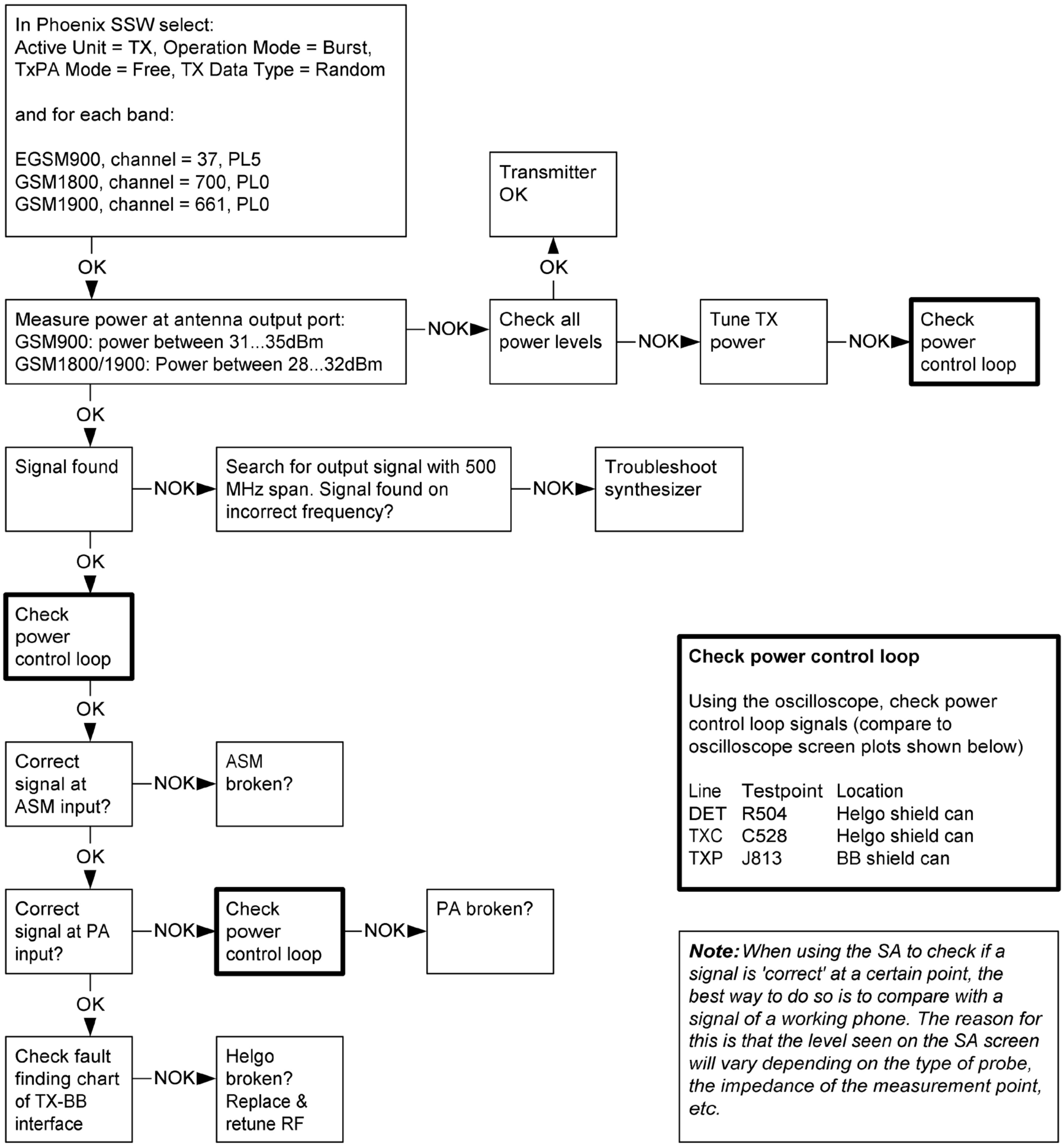


Figure 139 Oscilloscope screen shots

Troubleshooting RF side of transmitter


In Phoenix SSW select:
Active Unit = TX, Operation Mode = Burst,
TxPA Mode = Free, TX Data Type = Random
and for each band:
EGSM900, channel = 37, PL5
GSM1800, channel = 700, PL0
GSM1900, channel = 661, PL0
OK
Measure power at antenna output port:
GSM900: power between 31...35dBm
GSM1800/1900: Power between 28...32dBm
NOK
Check all power levels
OK
Transmitter OK
NOK
Tune TX power
NOK
Check power control loop
OK
Signal found
NOK
Search for output signal with 500 MHz span. Signal found on incorrect frequency?
NOK
Troubleshoot synthesizer
OK
Check power control loop
OK
Correct signal at ASM input?
NOK
ASM broken?
OK
Correct signal at PA input?
NOK
Check power control loop
NOK
PA broken?
OK
Check fault finding chart of TX-BB interface
NOK
Helgo broken? Replace & retune RF

Check power control loop

Using the oscilloscope, check power control loop signals (compare to oscilloscope screen plots shown below)

Line	Testpoint	Location
DET	R504	Helgo shield can
TXC	C528	Helgo shield can
TXP	J813	BB shield can

Note: *When using the SA to check if a signal is 'correct' at a certain point, the best way to do so is to compare with a signal of a working phone. The reason for this is that the level seen on the SA screen will vary depending on the type of probe, the impedance of the measurement point, etc.*

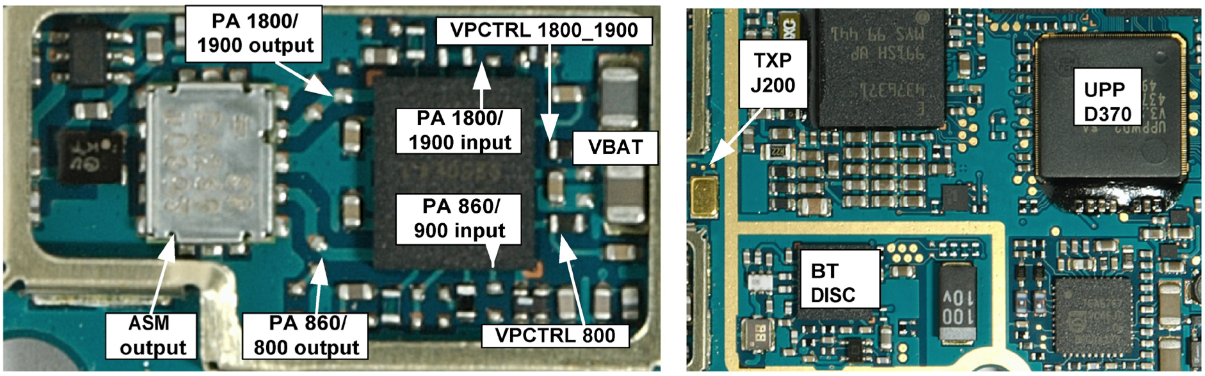

PA 1800/ 1900 output
VPCTRL 1800_1900
PA 1800/ 1900 input
VBAT
PA 860/ 900 input
ASM output
PA 860/ 800 output
VPCTRL 800
TXP J200
UPP D370
BT DISC

Figure 140 RF side of transmitter troubleshooting

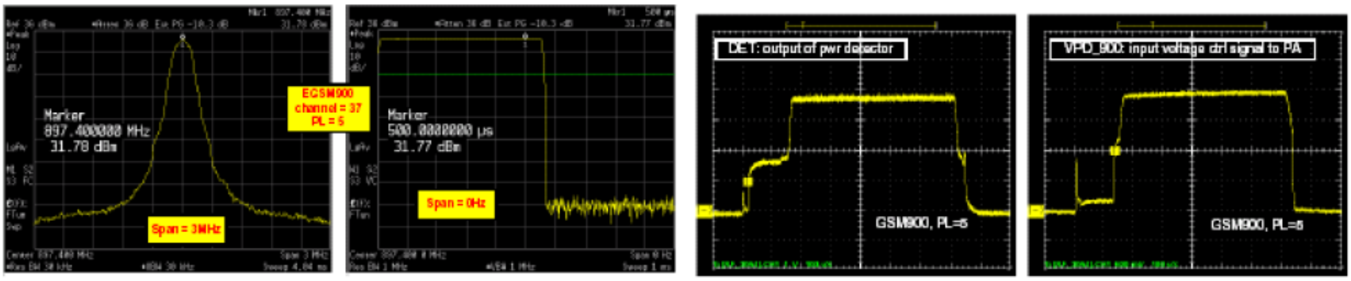


Figure 141 Oscilloscope screen shots (RF)

Introduction to transmitter tuning

In the transmitter, there are two kinds of tunings that can be done: IQ tuning and power level tuning. In general, different repairs require different tunings. In order to decide which tuning is necessary after a repair, it is important to understand the functionality of the repaired circuit. In general, it is recommended that if any TX component is changed, both these tunings be done. All tunings are done in local mode using Phoenix to control the phone.

As this mobile doesn't support the EDGE feature, you don't need to consider operating/tuning the phones in EDGE mode although Phoenix sometimes has a control selection box to enable EDGE.

Tuning TX/IQ

Context

The tuning must be carried out in all three bands. In addition to Phoenix, a spectrum analyzer (SA) is needed.

Steps

1. Connect the spectrum analyzer (SA) to the RF connector of the module jig. The settings of the SA will depend on the band to be tuned. The following table summarizes the settings for each of the three bands.

Table 8 Spectrum analyzer settings

	GSM900	GSM1800	GSM1900
Center frequency	897.4MHz	1747.8MHz	1880MHz
Frequency span	300kHz	300kHz	300kHz
Resolution Bandwidth	3kHz	3kHz	3kHz
Video Bandwidth	3kHz	3kHz	3kHz
Sweep Time	3 sec	3 sec	3 sec
Trace Type	Clear/Write	Clear/Write	Clear/Write
Detector Type	Max Peak	Max Peak	Max Peak
Reference Level	35dBm	35dBm	35dBm
Marker 1	897.33229 MHz	1747.73229 MHz	1879.93229 MHz
Marker 2	897.4MHz	1747.8MHz	1880MHz
Marker 3	897.46771MHz	1747.86771MHz	1880.06771MHz

2. Open the following two windows in Phoenix:

i select *Testing -> RF Controls*

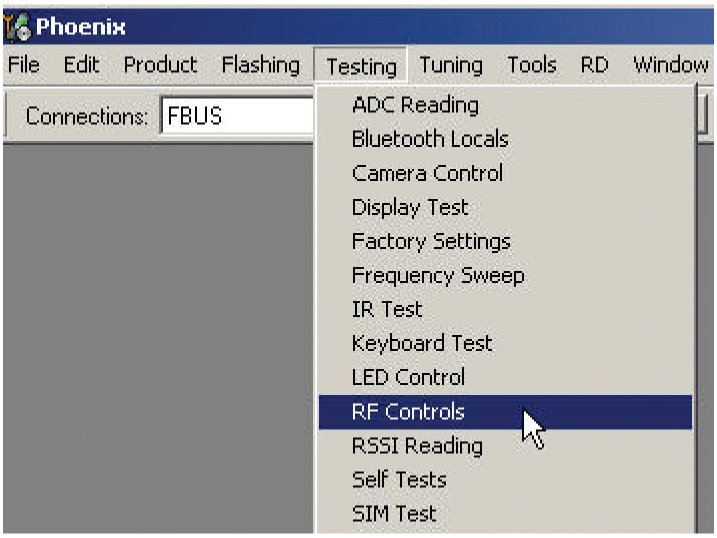

Phoenix
File Edit Product Flashing Testing Tuning Tools RD Window
Connections: FBUS
ADC Reading
Bluetooth Locals
Camera Control
Display Test
Factory Settings
Frequency Sweep
IR Test
Keyboard Test
LED Control
RF Controls
RSSI Reading
Self Tests
SIM Test

Figure 142 RF controls

ii select *Tuning -> TX IQ Tuning*.

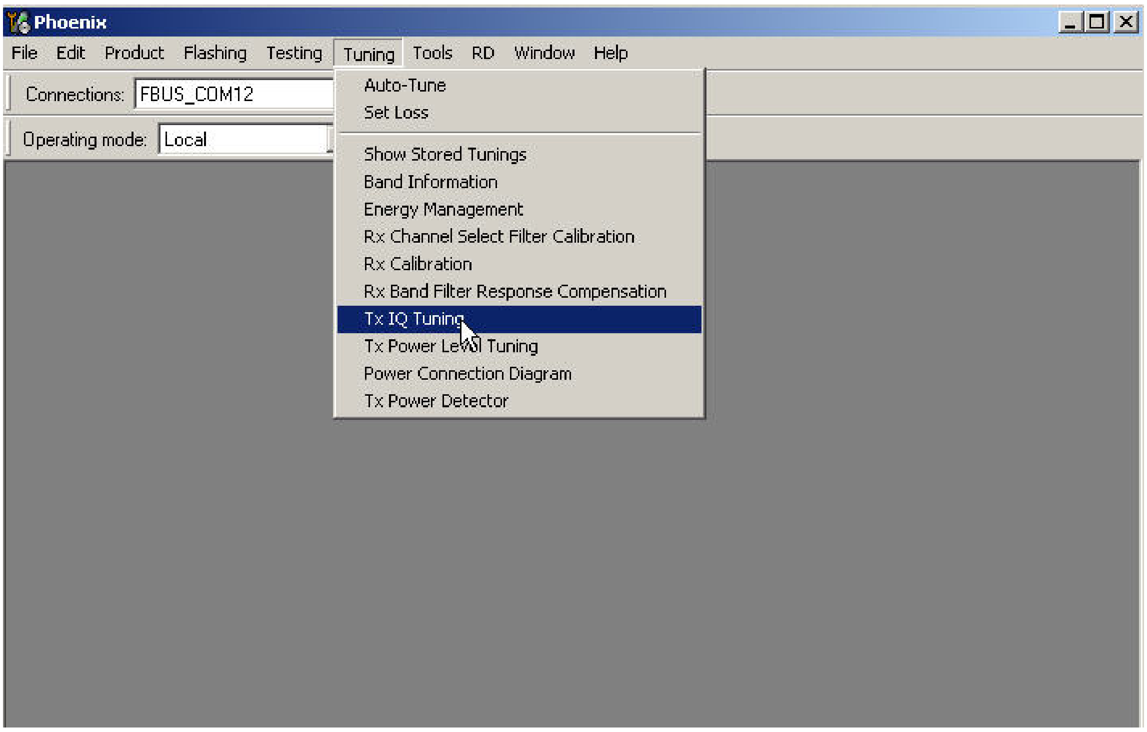
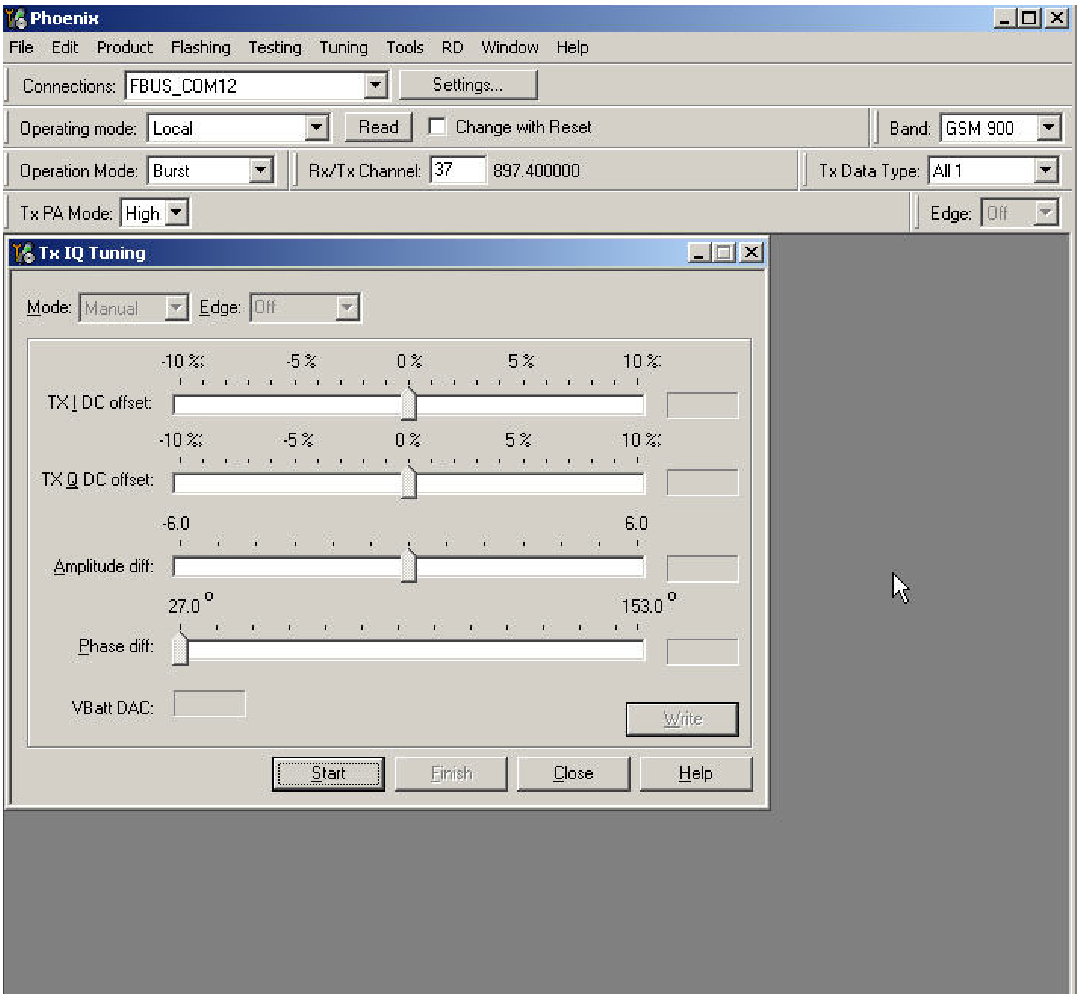

Phoenix
File Edit Product Flashing Testing Tuning Tools RD Window Help
Connections: FBUS_COM12
Operating mode: Local
Auto-Tune
Set Loss
Show Stored Tunings
Band Information
Energy Management
Rx Channel Select Filter Calibration
Rx Calibration
Rx Band Filter Response Compensation
Tx IQ Tuning
Tx Power Level Tuning
Power Connection Diagram
Tx Power Detector

Figure 143 Tx IQ tuning

After opening the two windows, Phoenix should look like this:



Phoenix
File Edit Product Flashing Testing Tuning Tools RD Window Help
Settings...
Read
Tx IQ Tuning
-10 % -5 % 0 % 5 % 10 %
TX I DC offset:
TX Q DC offset:
-6.0 6.0
Amplitude diff:
27.0 ° 153.0 °
Phase diff:
VBatt DAC:
Write
Start
Finish
Close
Help

Connections: FBUS_COM12
Operating mode: Local
☐ Change with Reset
Band: GSM 900
Operation Mode: Burst
Rx/Tx Channel: 37 897.400000
Tx Data Type: All 1
Tx PA Mode: High
Edge: Off
Mode: Manual
Edge: Off

Figure 144 Phoenix set-up (Tx IQ Tuning windows)

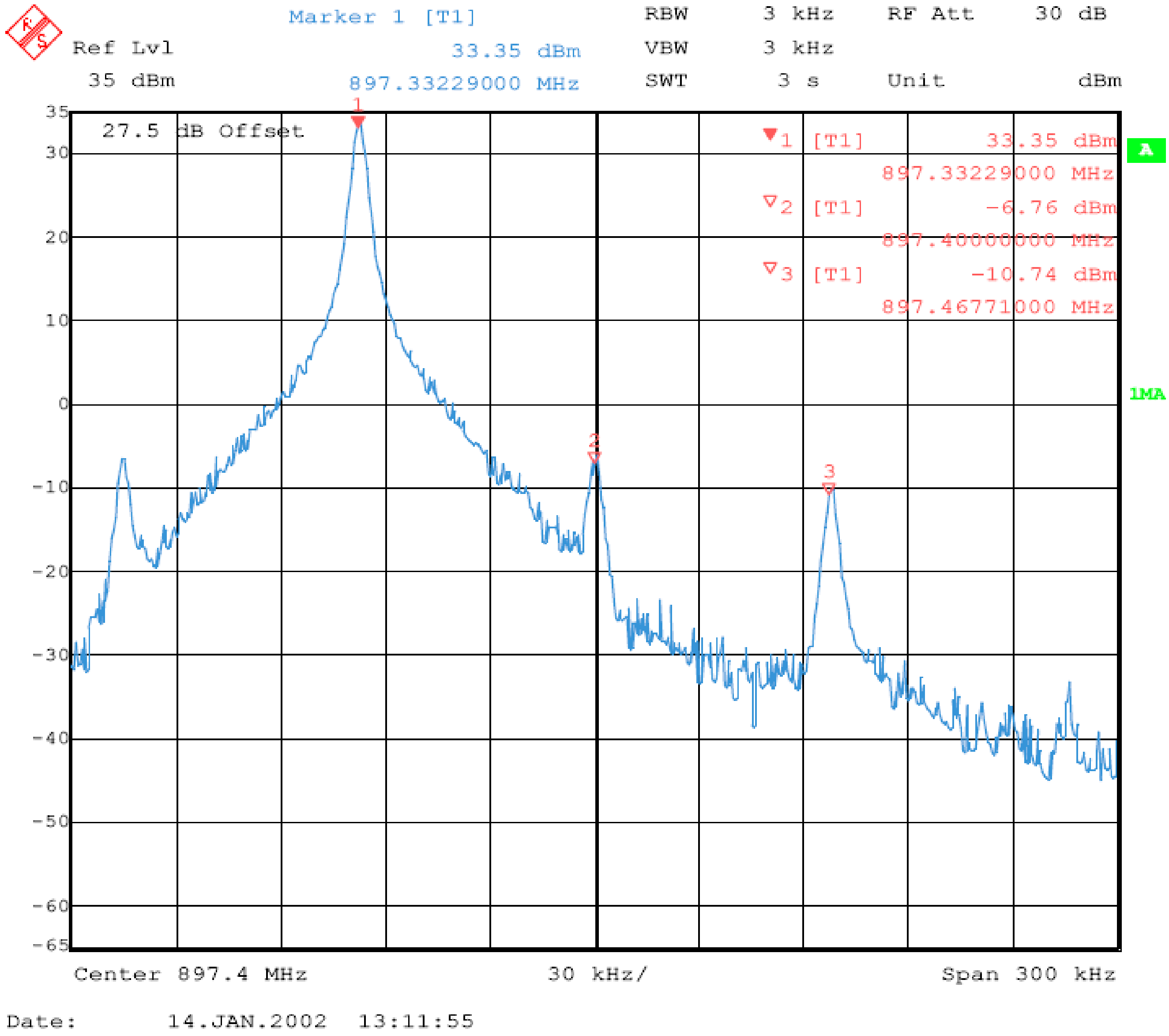
3. Select correct settings for the band you are tuning. The following table summarises the settings of the RF control window for IQ tuning of the three bands.

Table 9 RF Control window settings

Band	TX Data Type	TX Power Level	RX/TX Channel
GSM900	All 1	5	37
GSM1800	All 1	0	700
GSM1900	All 1	0	661

4. Start IQ tuning by pressing *Start* button in the *TX IQ Tuning* window.

   The purpose of this tuning is to reduce the frequency components at marker 2 (carrier leakage) and marker 3 (+67kHz/upper sideband) as much as possible.



```
                    Marker 1 [T1]          RBW    3 kHz    RF Att    30 dB
Ref Lvl                   33.35 dBm        VBW    3 kHz
 35 dBm             897.33229000 MHz       SWT     3 s     Unit        dBm

 27.5 dB Offset
                                  ▼1  [T1]          33.35 dBm
                                              897.33229000 MHz
                                  ▽2  [T1]          -6.76 dBm
                                              897.40000000 MHz
                                  ▽3  [T1]         -10.74 dBm
                                              897.46771000 MHz

Center 897.4 MHz                 30 kHz/                Span 300 kHz

Date:       14.JAN.2002   13:11:55
```

Figure 145 Spectrum analyzer screen shot when performing IQ tuning, part 1

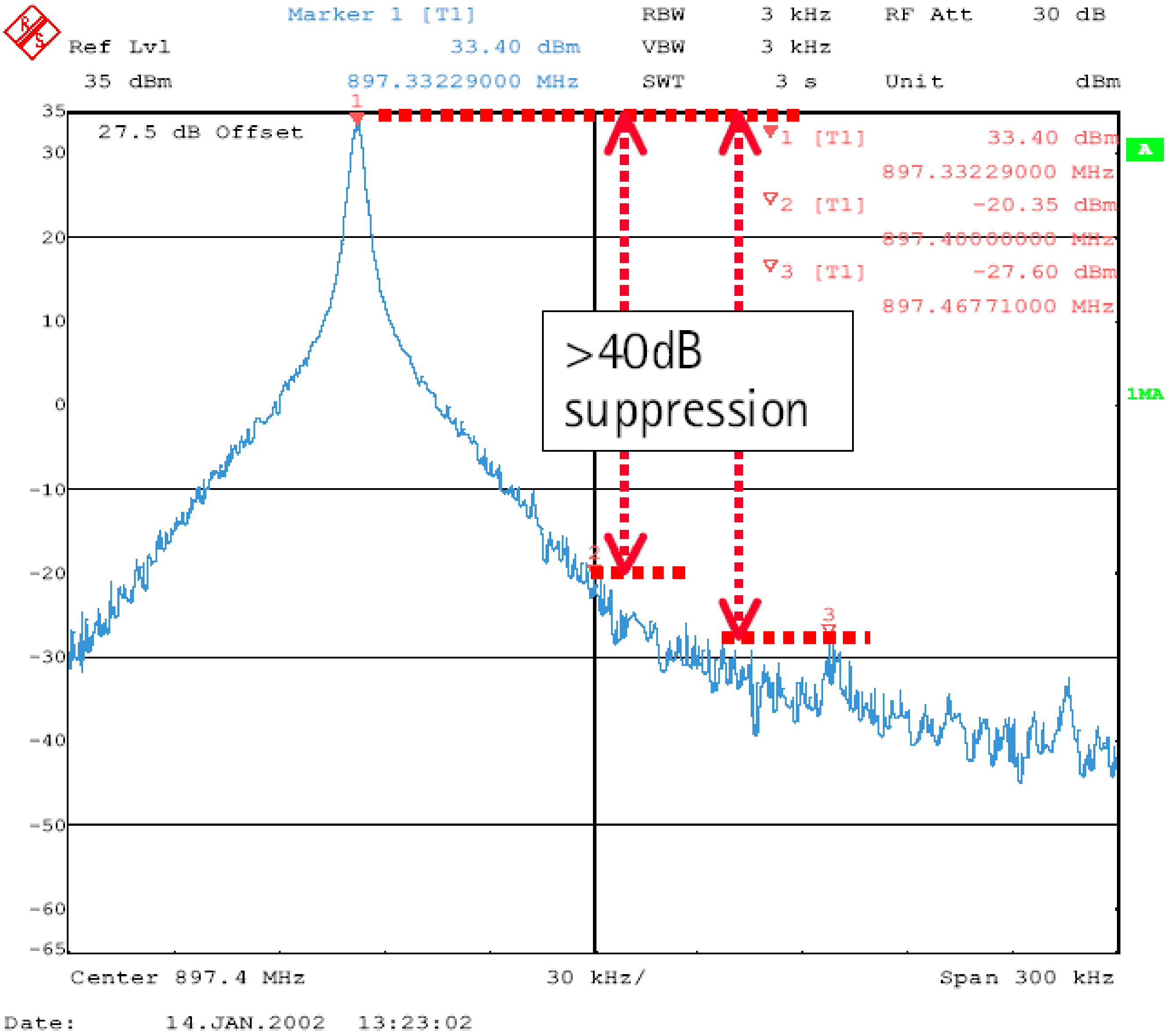
5. Adjust the 'TXI DC Offset' and the 'TXQ DC Offset' buttons in the *TX IQ Tuning* window so that the carrier level (marker 2) reaches a minimum.

   After this adjustment is done, the carrier (marker 2) should be at least 40dB below the lower side band (marker 1).

6. Use the 'Amplitude difference' and the 'Phase difference' buttons in the *TX IQ Tuning* window to adjust the upper side band (marker 3) to a minimum.

   Now, marker 3 should also be at least 40dB below marker 1.

   At this point, the spectrum analyzer screen should look similar to that of the figure below.



Marker 1 [T1] 33.40 dBm 897.33229000 MHz
Ref Lvl 35 dBm
RBW 3 kHz
VBW 3 kHz
SWT 3 s
RF Att 30 dB
Unit dBm

1 [T1] 33.40 dBm 897.33229000 MHz
2 [T1] -20.35 dBm 897.40000000 MHz
3 [T1] -27.60 dBm 897.46771000 MHz

Center 897.4 MHz
30 kHz/
Span 300 kHz

Date: 14.JAN.2002 13:23:02

Figure 146 Spectrum analyzer screen shot when performing IQ tuning, part 2

7. After reducing the amplitude of the frequency components at marker 2 and 3 to a minimum, press *Save & Continue*.

   The EGSM tuning has now been completed.

Next action

Now, using the spectrum analyzer settings listed in Table "Spectrum analyzer settings" and the RF control settings listed in Table "RF Control window settings", follow exactly the same procedure to perform IQ tuning in the GSM1800 and GSM1900 bands.

Tuning TX power level

Context

This tuning is done separately in all three bands, and requires a spectrum analyzer to measure the burst power of the GSM RF signal. When measuring the RF output (burst) power on a spectrum analyzer, use the settings found in the following table:

Table 10 Spectrum analyzer settings for Tx power level tuning

	GSM900	GSM1800	GSM1900
Center frequency	897.4MHz	1747.8MHz	1880MHz
Frequency span	Zero-span	Zero-span	Zero-span
Resolution Bandwidth	1MHz	1MHz	1MHz
Video Bandwidth	1MHz	1MHz	1MHz
Sweep Time	1ms	1ms	1ms
Trigger Type	Video	Video	Video
Video trigger level	Target pwr – 10dB	Target pwr – 10dB	Target pwr – 10dB
Trace Type	Clear/Write	Clear/Write	Clear/Write
Detector Type	Max Peak	Max Peak	Max Peak
Reference Level	Target power level + 10dB	Target power level + 10dB	Target power level + 10dB
Internal Attenuation	Target power level + 10dB	Target power level + 10dB	Target power level + 10dB

Steps

1. In Phoenix, select *Tuning -> TX Power Level Tuning*.

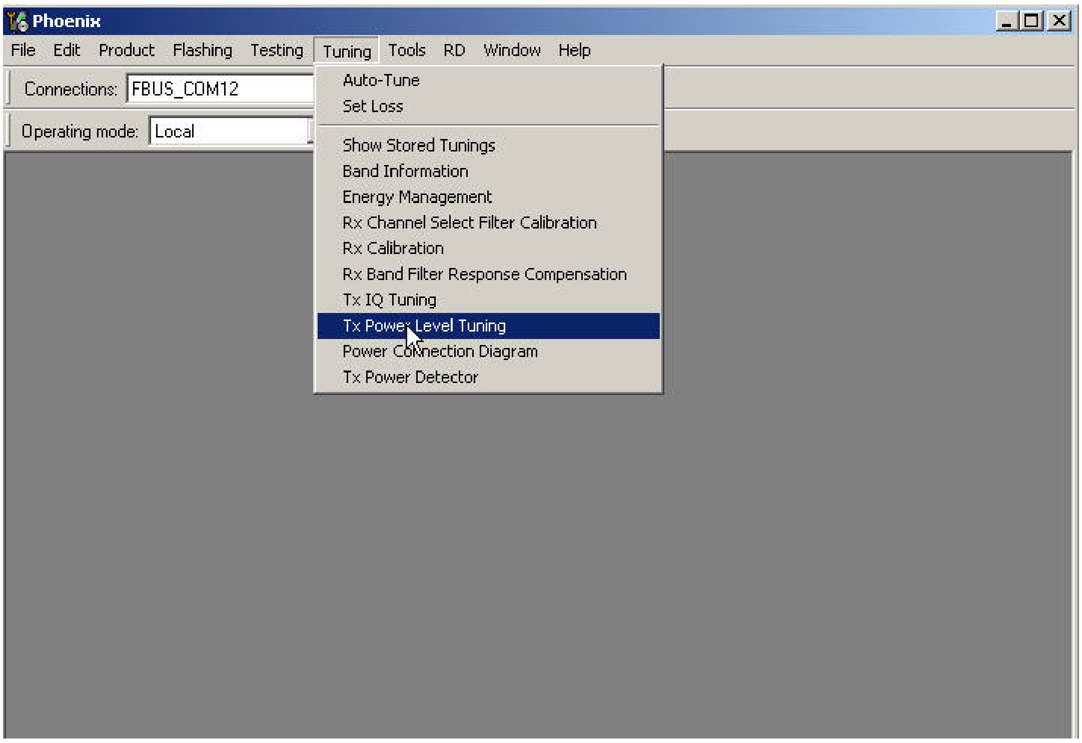
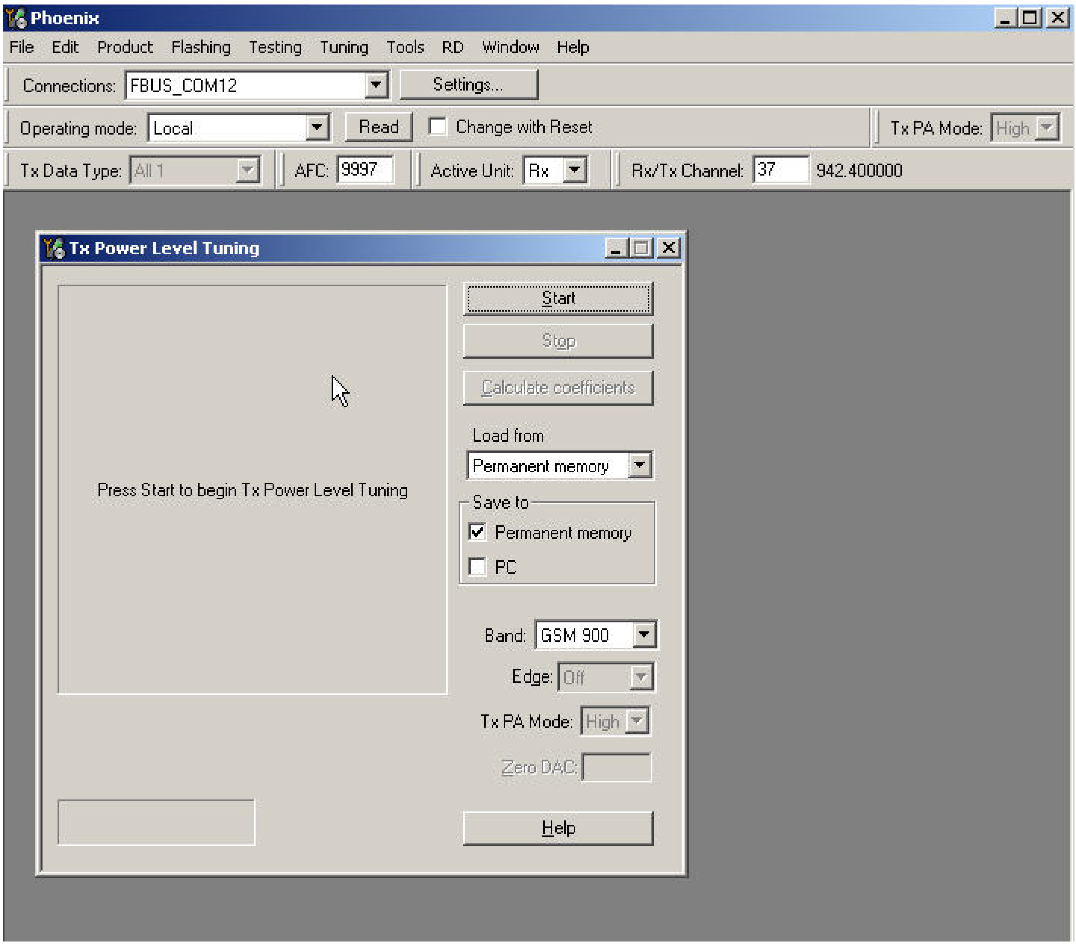

Phoenix
File Edit Product Flashing Testing Tuning Tools RD Window Help
Connections: FBUS_COM12
Operating mode: Local
Auto-Tune
Set Loss
Show Stored Tunings
Band Information
Energy Management
Rx Channel Select Filter Calibration
Rx Calibration
Rx Band Filter Response Compensation
Tx IQ Tuning
Tx Power Level Tuning
Power Connection Diagram
Tx Power Detector

Figure 147 Phoenix menu select (Tx Power Level Tuning menu)

Phoenix should now look similar to the figure below.



Connections: FBUS_COM12

Operating mode: Local

☐ Change with Reset

Tx PA Mode: High

Tx Data Type: All 1

AFC: 9997

Active Unit: Rx

Rx/Tx Channel: 37 942.400000

Press Start to begin Tx Power Level Tuning

Load from: Permanent memory

Save to

☑ Permanent memory

☐ PC

Band: GSM 900

Edge: Off

Tx PA Mode: High

Zero DAC:

Figure 148 Phoenix Power Level Tuning menu

2. Connect the module jig RF output to the measurement instrument. The power must be tuned in only high TX PA mode in all bands of GSM900, GSM1800 and GSM1900.
3. For each band, tune the power by adjusting the coefficient in the *Tx Power Level Tuning* window in Phoenix until the target level is reached (measured on the spectrum analyzer). Remember to take into account the external power loss, that is, the loss of the cable and the external attenuator at the spectrum analyzer input.

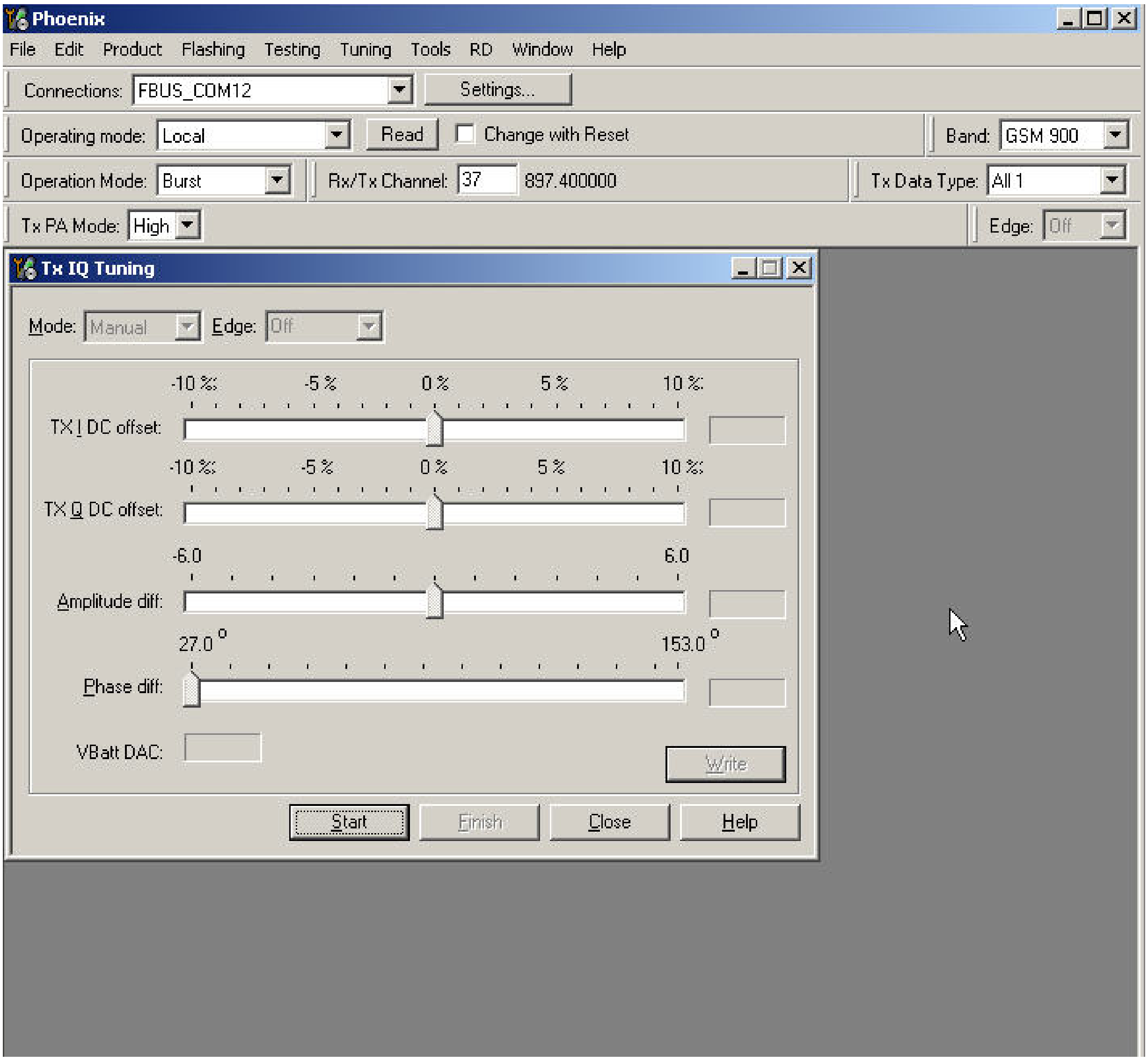
   The coefficient must be tuned for the base level and other levels marked with bold letters in Phoenix (GSM900: PL19 / 15 / 5, GSM1800/1900: PL15, 11, 0). The target power levels are specified as listed in the following table:

Table 11 Power level targets

GSM900		GSM1800		GSM1900	
LV5	33.0dBm	LV0	30.0dBm	LV0	29.5dBm
LV15	13.0dBm	LV11	8.0dBm	LV11	8.0dBm
LV19	5.0dBm	LV15	0.0dBm	LV15	0.0dBm
Base	-30.0dBm	Base	-30.0dBm	Base	-30.0dBm

4. When the tuning for the levels marked with bold letters has been completed, press *Calculate coefficients* to calculate the other power levels with non-bold letters.
5. When the coefficient calculation has been successfully done, press *Save & Continue* to save the new tuning values into the phone memory.

   The following figure shows the power level tuning at the GSM900 band.


Connections: FBUS_COM12

Operating mode: Local

☐ Change with Reset

Band: GSM 900

Operation Mode: Burst

Rx/Tx Channel: 37 897.400000

Tx Data Type: All 1

Tx PA Mode: High

Edge: Off

Mode: Manual

Edge: Off

Phoenix
File
Edit
Product
Flashing
Testing
Tuning
Tools
RD
Window
Help
Settings...
Read
Tx IQ Tuning
TX I DC offset:
-10 %
-5 %
0 %
5 %
10 %
TX Q DC offset:
Amplitude diff:
-6.0
6.0
Phase diff:
27.0 °
153.0 °
VBatt DAC:
Write
Start
Finish
Close
Help

Figure 149 Phoenix screen shot (Tx Power Level Tuning)

The figure below shows one example from the spectrum analyzer screen during measuring the Tx power level.

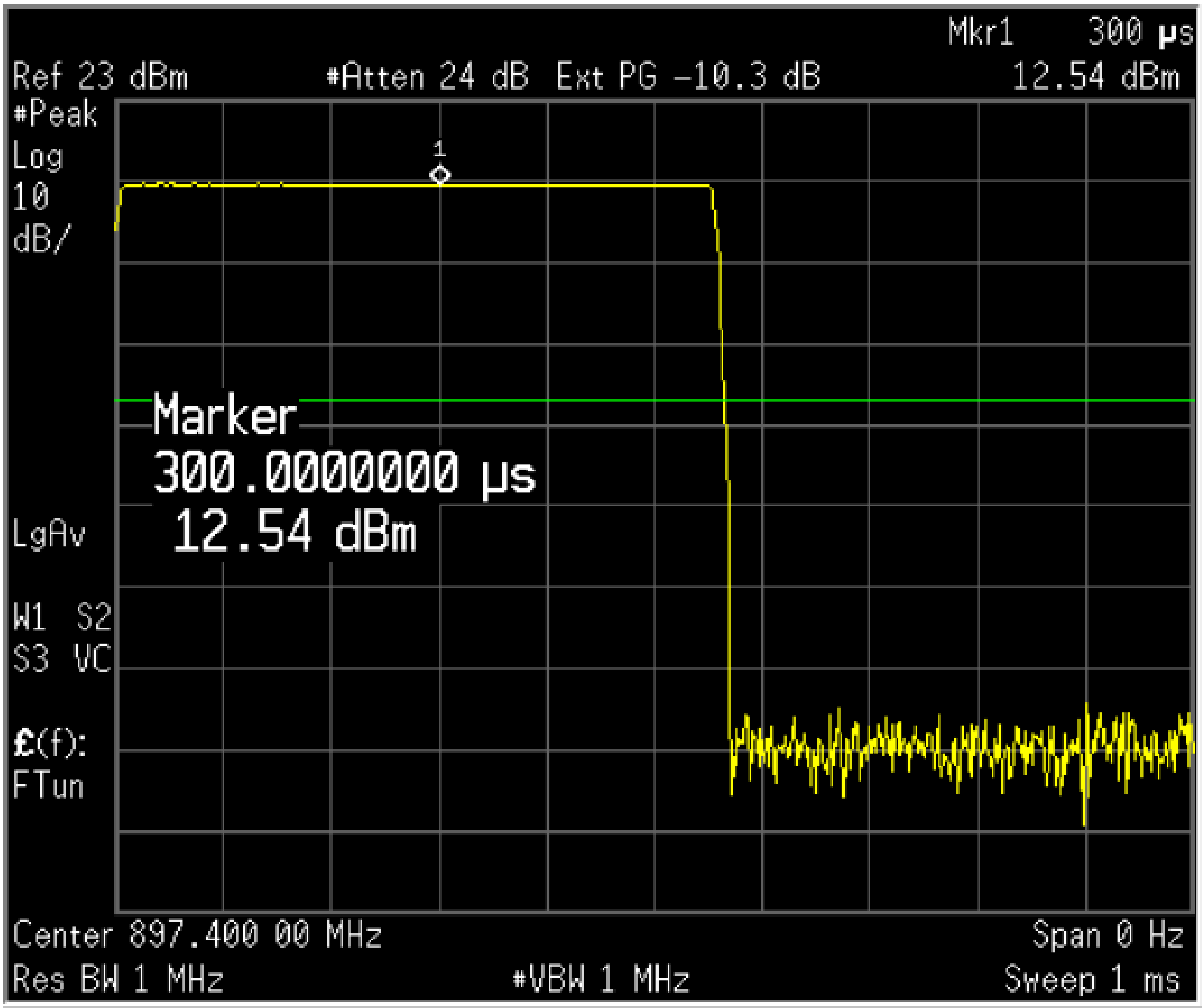

Mkr1 300 µs
Ref 23 dBm
#Atten 24 dB
Ext PG -10.3 dB
12.54 dBm
#Peak
Log
10
dB/
1
Marker
300.0000000 µs
12.54 dBm
LgAv
W1 S2
S3 VC
£(f):
FTun
Center 897.400 00 MHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 1 ms

Figure 150 Spectrum analyzer screen shot during power level tuning

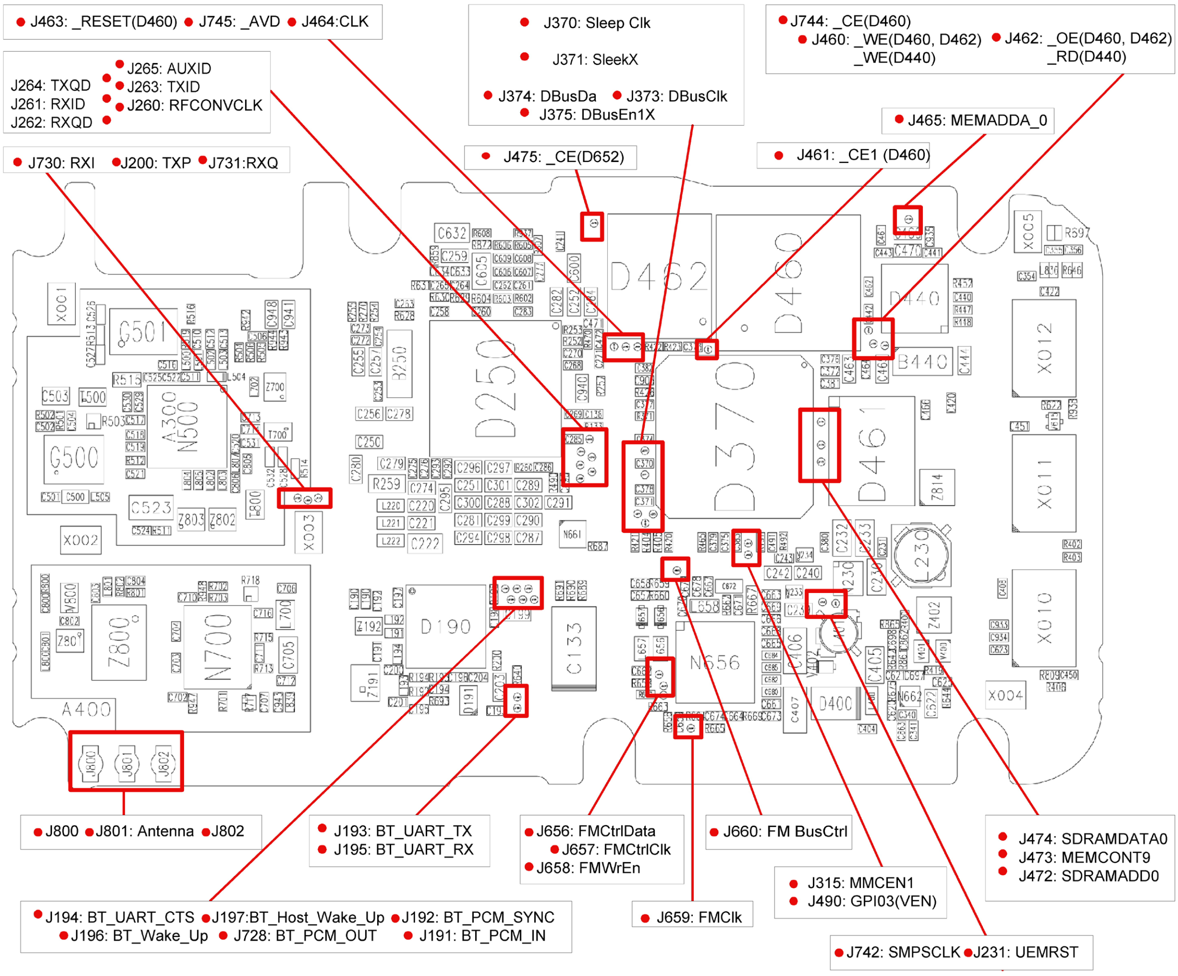

J463: _RESET(D460)
J745: _AVD
J464:CLK
J370: Sleep Clk
J371: SleekX
J374: DBusDa
J373: DBusClk
J375: DBusEn1X
J744: _CE(D460)
J460: _WE(D460, D462) _WE(D440)
J462: _OE(D460, D462) _RD(D440)
J265: AUXID
J264: TXQD
J263: TXID
J261: RXID
J260: RFCONVCLK
J262: RXQD
J465: MEMADDA_0
J730: RXI
J200: TXP
J731:RXQ
J475: _CE(D652)
J461: _CE1 (D460)
D462
D460
D440
B440
D370
D461
D250
G501
A300
N500
G500
Z800
N700
A400
D190
C133
N656
L230
X001
X002
X003
X005
X012
X011
X010
X004
J800
J801
J802
J800 J801: Antenna J802
J193: BT_UART_TX
J195: BT_UART_RX
J656: FMCtrlData
J657: FMCtrlClk
J658: FMWrEn
J660: FM BusCtrl
J474: SDRAMDATA0
J473: MEMCONT9
J472: SDRAMADD0
J315: MMCEN1
J490: GPI03(VEN)
J194: BT_UART_CTS
J197:BT_Host_Wake_Up
J192: BT_PCM_SYNC
J196: BT_Wake_Up
J728: BT_PCM_OUT
J191: BT_PCM_IN
J659: FMClk
J742: SMPSCLK
J231: UEMRST

Figure 151 Testpoints of the main board, top part

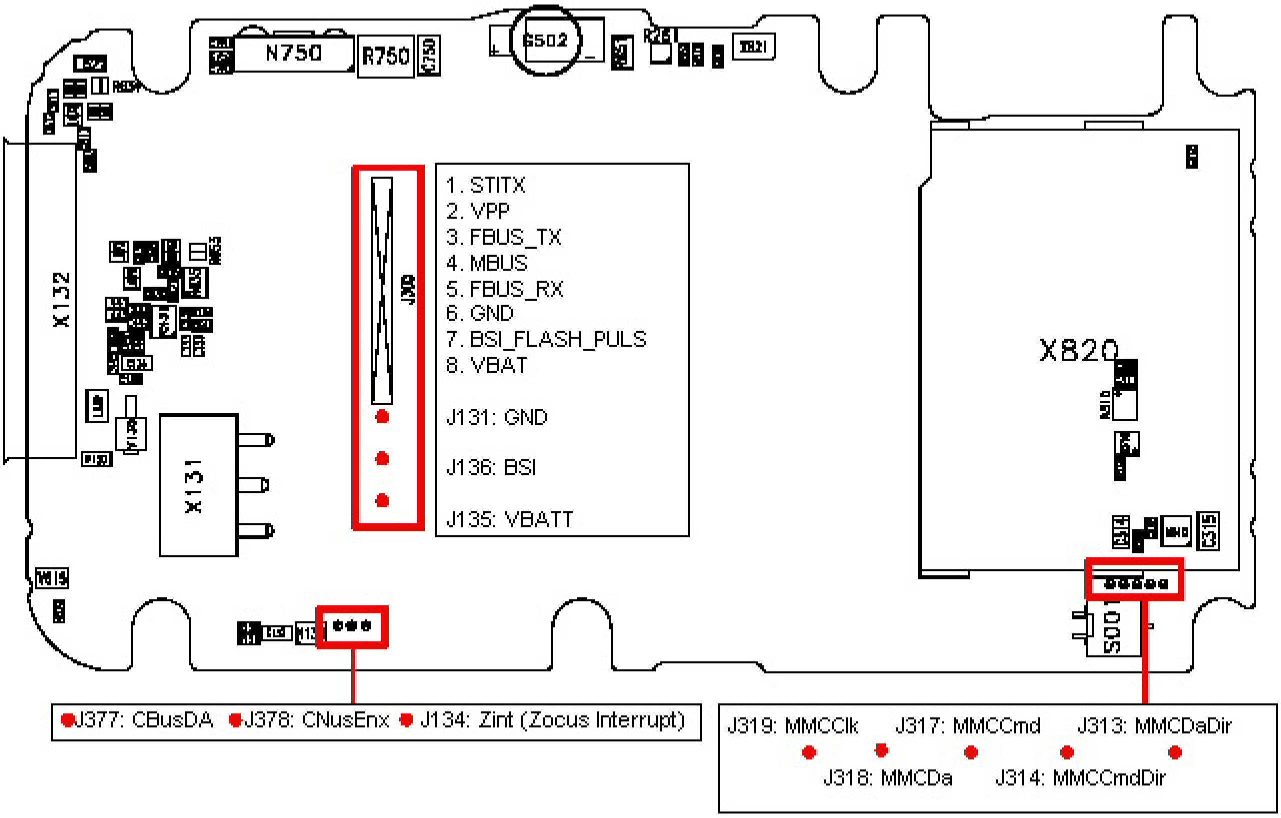

N750
R750
C750
G502
R281
X132
X131
X820
S001
C315
1. STITX
2. VPP
3. FBUS_TX
4. MBUS
5. FBUS_RX
6. GND
7. BSI_FLASH_PULS
8. VBAT
J131: GND
J136: BSI
J135: VBATT
J377: CBusDA
J378: CNusEnx
J134: Zint (Zocus Interrupt)
J319: MMCClk
J317: MMCCmd
J313: MMCDaDir
J318: MMCDa
J314: MMCCmdDir

Figure 152 Testpoints of the main board, bottom part

Introduction to synthesizer troubleshooting

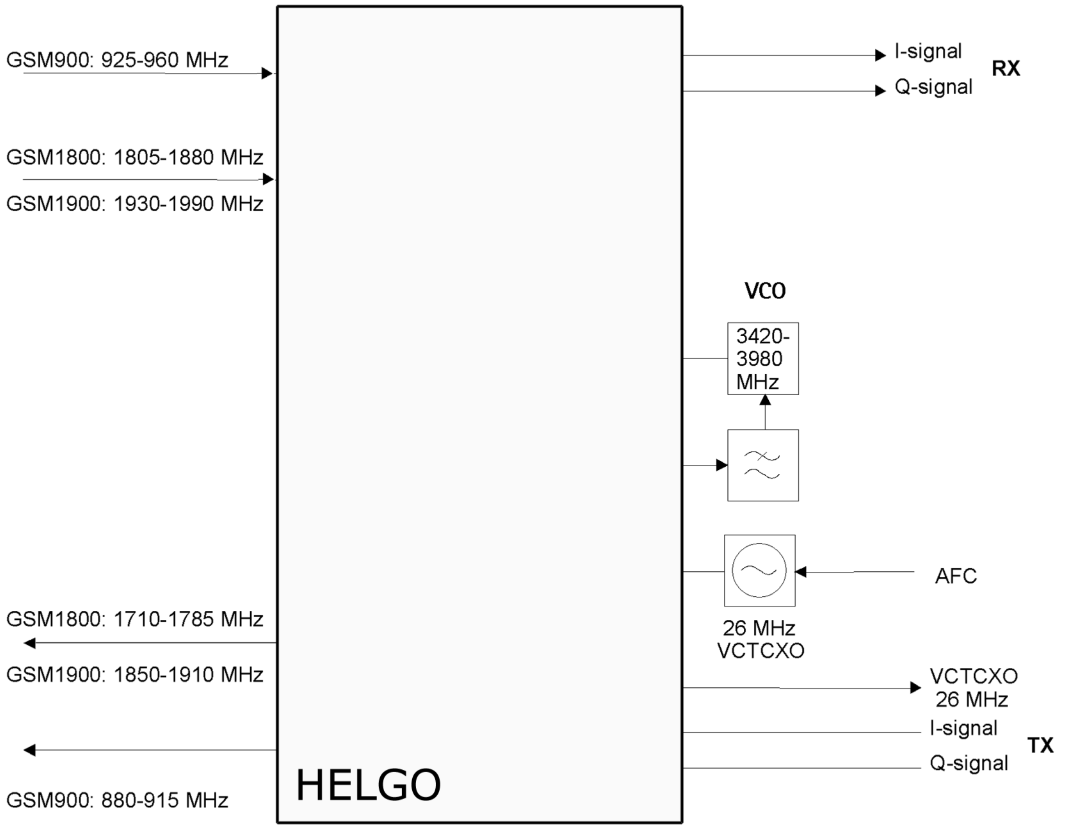

GSM900: 925-960 MHz
GSM1800: 1805-1880 MHz
GSM1900: 1930-1990 MHz
GSM1800: 1710-1785 MHz
GSM1900: 1850-1910 MHz
GSM900: 880-915 MHz
HELGO
I-signal
Q-signal
RX
VCO
3420-3980 MHz
AFC
26 MHz VCTCXO
VCTCXO 26 MHz
I-signal
Q-signal
TX

Figure 153 Synthesizer block diagram

The VCO frequency is locked by a PLL (phase locked loop) into a stable frequency source given by a VCTCXO, which is running at 26 MHz. The frequency of the VCTCXO is in turn locked into the frequency of the base station with the help of an AFC (automatic frequency control) voltage, which is generated in UEMEK by an 11-bit D/A (digital-to-analog) converter.

The PLL is capable of tuning frequency range for GSM bands 900/1800/1900. It is integrated in Helgo and controlled through the RFBus. The PLL consists of a 64/65 (P/P+1) prescaler, N- and A-divider, reference divider, phase detector and a charge pump for the external loop filter.

The 4 GHz oscillator signal, generated by the VCO, is fed through a 180 degrees balanced phase shifter to the prescaler and the output of the prescaler is fed to the N- and A-divider, which produces the input to the phase detector. The phase detector compares this signal to the reference signal, which is divided by the reference divider from the VCTCXO frequency.

The frequency of the reference signal is 400 kHz. The output of the phase detector is connected to the charge pump, which charges or discharges the integrator capacitor in the loop filter depending on the phase of the measured frequency compared to the reference frequency.

The integrator output voltage is finally connected to the control input of the VCO. The VCO operates at the channel frequency multiplied by two in GSM1800/1900 and by four in EGSM900.

The required frequency dividers for modulator and demodulator mixers are integrated in Helgo.

The loop filter filters out the comparison pulses of the phase detector and generates a DC control voltage to the VCO. The loop filter determines the step response of the PLL (settling time) and contributes to the stability of the loop.

Other filter components are for sideband rejection.

The dividers are controlled via the RFBus. RFBusData is for the data, RFBusClk is a serial clock for the bus and RFBusEna1X is a latch enable, which stores the new data into the dividers.

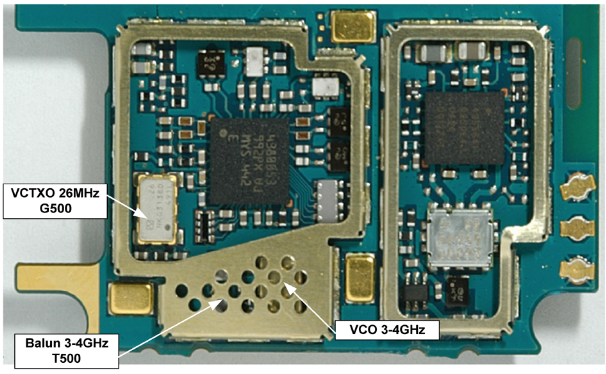


Figure 154 Synthesizer key components

Assumption

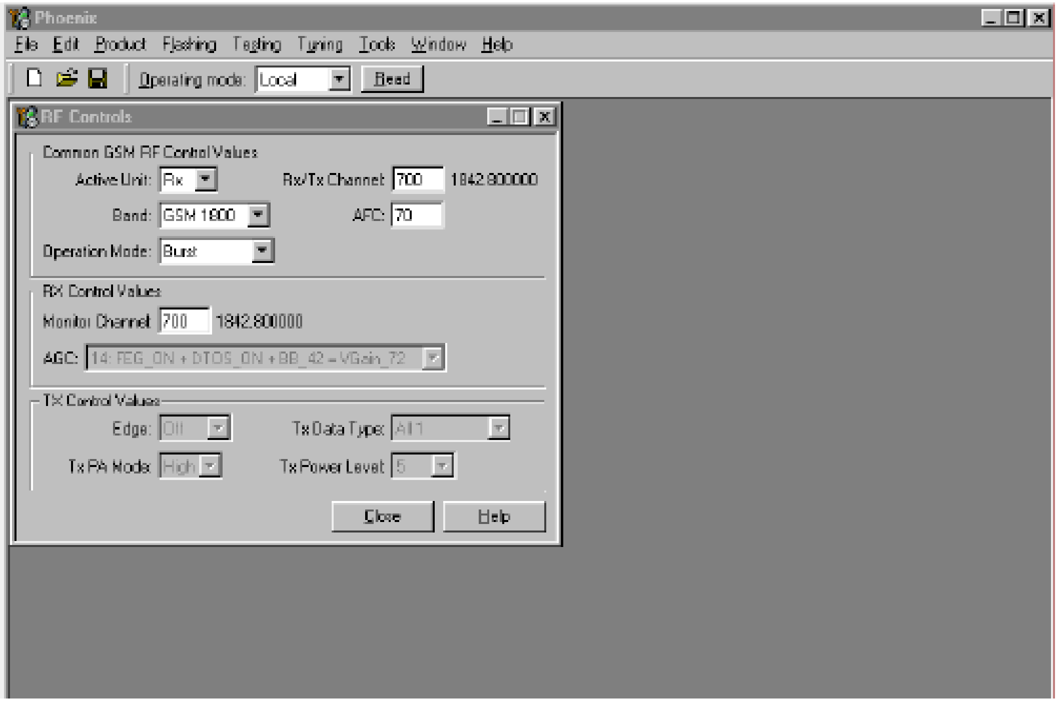
- No soldering or component failure for simple SMD components such as resistors, inductors and capacitors
- Failure in one particular operating GSM channel, whether Tx or Rx, in which the synthesizer is the cause of the failure, causes failure in all other GSM channels in Tx/Rx.

Preparing for synthesizer troubleshooting

Steps

1. Place the phone (mechanics removed) on module jig.
2. Connect the module jig to the PC via a DAU-9P cable.
3. Connect the module jig to a power supply (4.2V).
4. Connect the RF output to a spectrum analyzer or another measurement instrument.
5. Use a 10dB attenuator at the input to spectrum analyzer to avoid damage.
6. Make sure the dongle is connected and start Phoenix.
7. In Phoenix, select *File -> Open Product -> RM-51 (Nokia 3230) Product Menu*.
8. Select *Testing -> RF Controls*.
9. In the toolbar: set *Operating Mode -> Local*.
10. Select *Band -> GSM 1800*.
11. Set *Operation Mode -> Continuous*.
12. Set *Active Unit -> Rx*.

13. Set *Rx/Tx Channel* -> *700*.


Phoenix
File Edit Product Flashing Testing Tuning Tools Window Help
Read
RF Controls
Close
Help

Operating mode: Local

Common GSM RF Control Values
Active Unit: Rx
Rx/Tx Channel: 700 1842.800000
Band: GSM 1800
AFC: 70
Operation Mode: Burst

RX Control Values
Monitor Channel: 700 1842.800000
AGC: 14: FEG_ON + DTOS_ON + BB_42 = VGain_72

TX Control Values
Edge: Off
Tx Data Type: All1
Tx PA Mode: High
Tx Power Level: 5

Figure 155 Preparation for troubleshooting using Phoenix RF control setup

Measuring the synthesizer manually using spectrum analyzer

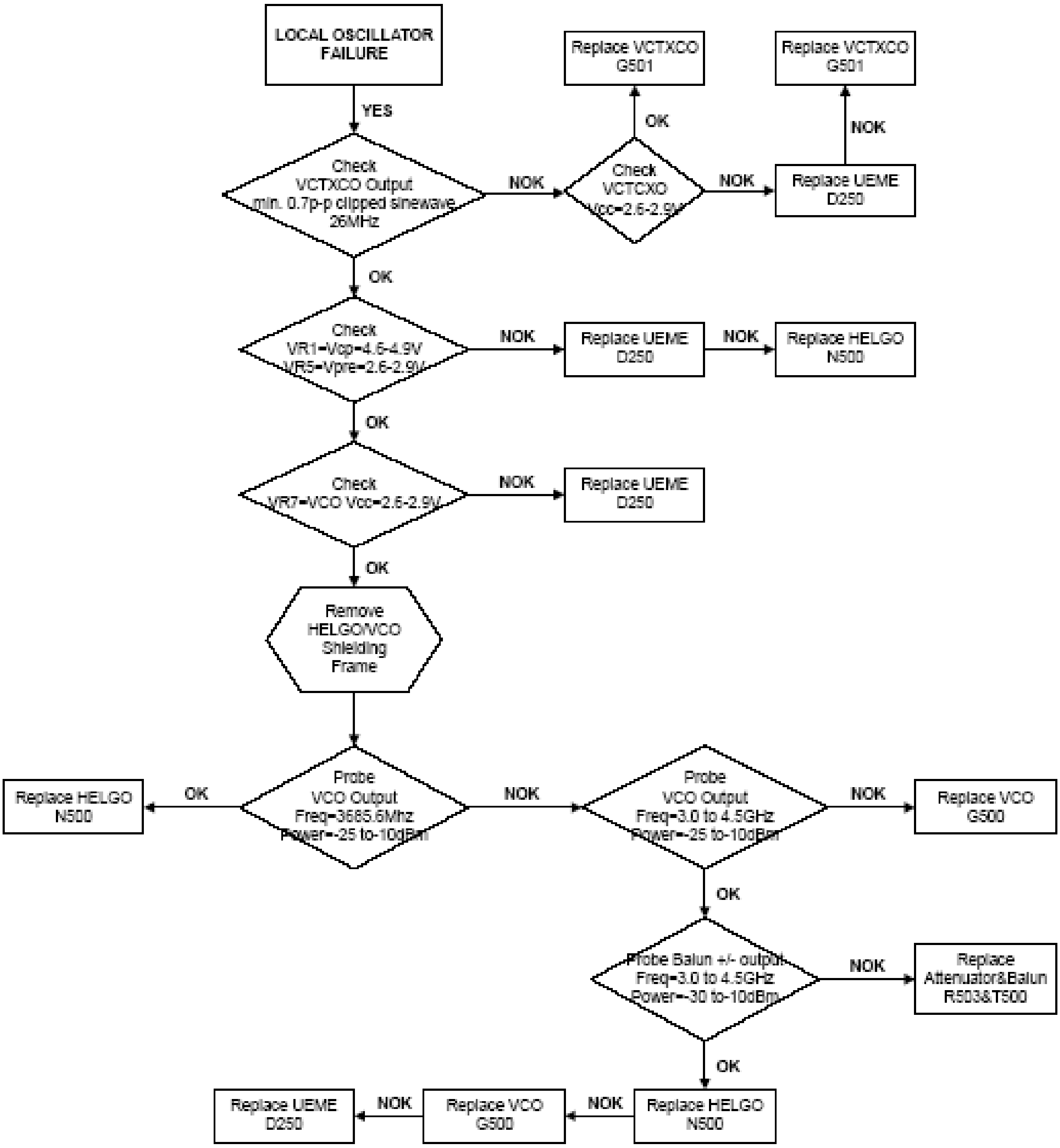

LOCAL OSCILLATOR FAILURE
YES
Check VCTXCO Output min. 0.7p-p clipped sinewave 26MHz
NOK
Check VCTCXO Vcc=2.6-2.9V
OK
Replace VCTXCO G501
NOK
Replace UEME D250
NOK
Replace VCTXCO G501
OK
Check VR1=Vcp=4.6-4.9V VR5=Vpre=2.6-2.9V
NOK
Replace UEME D250
NOK
Replace HELGO N500
OK
Check VR7=VCO Vcc=2.6-2.9V
NOK
Replace UEME D250
OK
Remove HELGO/VCO Shielding Frame
Probe VCO Output Freq=3685.6Mhz Power=-25 to-10dBm
OK
Replace HELGO N500
NOK
Probe VCO Output Freq=3.0 to 4.5GHz Power=-25 to-10dBm
NOK
Replace VCO G500
OK
Probe Balun +/- output Freq=3.0 to 4.5GHz Power=-30 to-10dBm
NOK
Replace Attenuator&Balun R503&T500
OK
Replace HELGO N500
NOK
Replace VCO G500
NOK
Replace UEME D250

Figure 156 Troubleshooting chart for synthesizer

Spectrum analyzer level values depend on the probe type and should be validated using a known good sample. The levels that are given here are measured using a high frequency probe. Spectrum analyzer should be at least capable of measuring signal upto 4.5 GHz.

Bluetooth

Bluetooth component placement

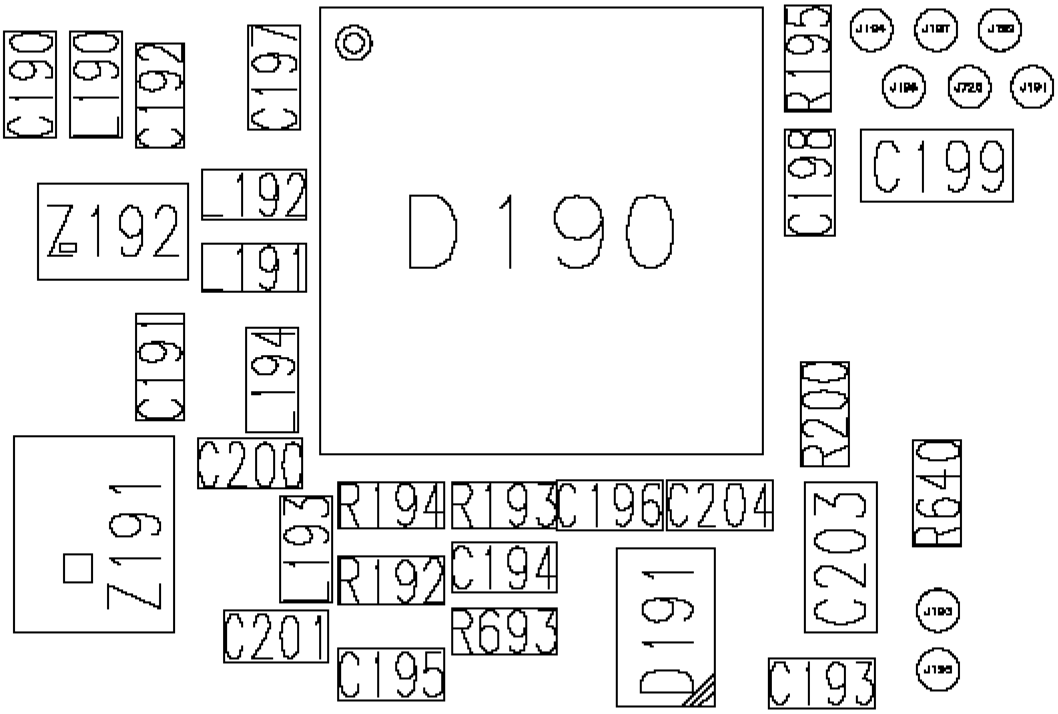

C190
L190
C192
C197
D190
R195
J194
J197
J196
J720
J191
C198
C199
Z192
L192
L191
C191
L194
R200
R640
C200
Z191
L193
R194
R193
C196
C204
R192
C194
D191
C203
C201
C195
R693
C193
J193
J195

Figure 157 Bluetooth component placement

Note: This component placement is taken from a B3 prototype and is subject to change in the future.

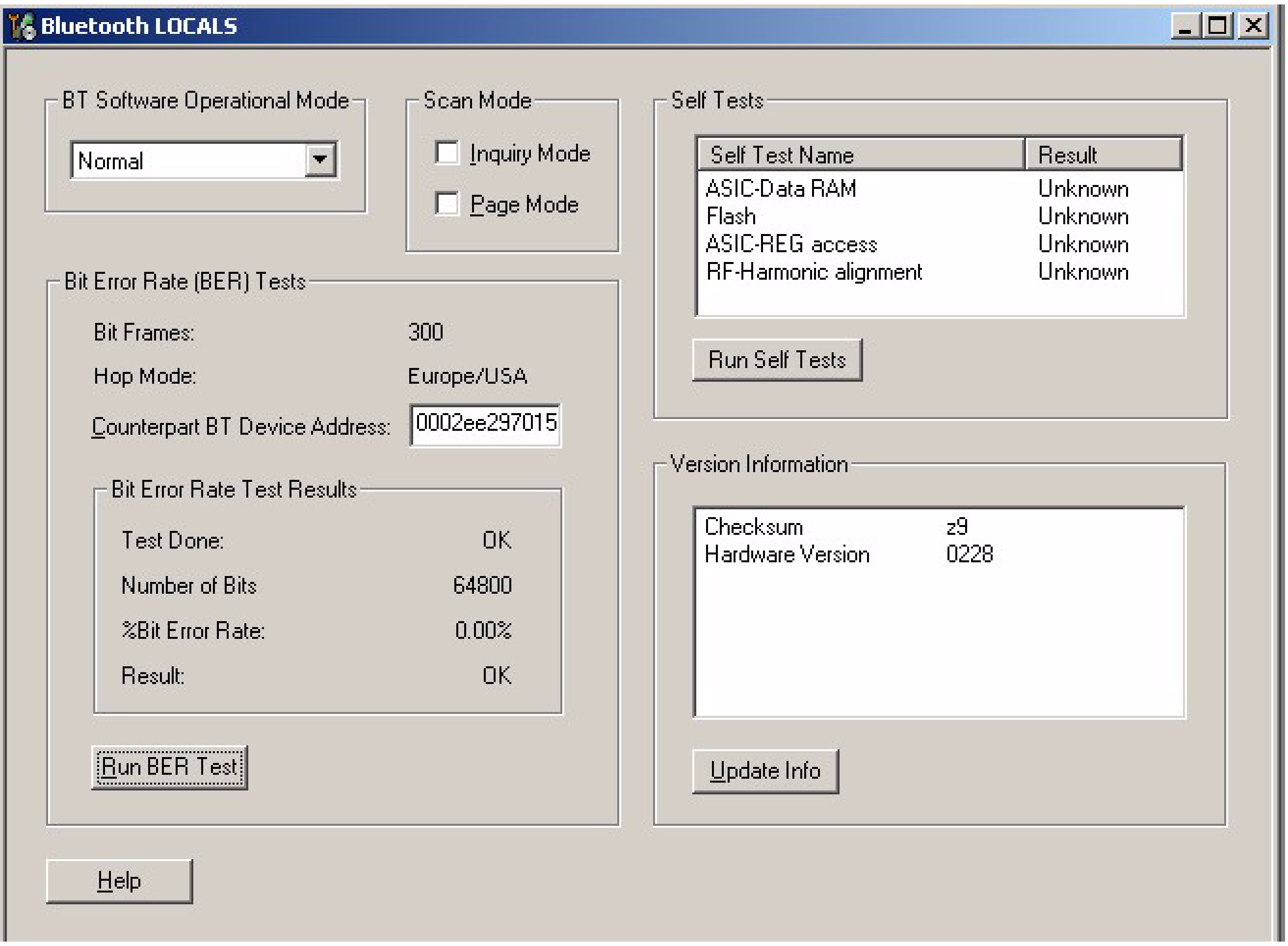
Bluetooth settings for Phoenix

Steps

1. Start Phoenix service software.
2. From the File menu, choose Open Product, and then choose the correct type designator from the Product list.
3. Connect the phone to a docking station in the local mode.
4. From the Testing menu, choose Bluetooth LOCALS.
5. Locate JBT-9's serial number (12 digits) found in the type label on the back of JBT-9.
6. In the Bluetooth LOCALS window, write the 12-digit serial number on the "Counterpart BT Device Address" line.

   This needs to be done only once provided that JBT-9 is not changed.
7. Place the JBT-9 box near (within 10 cm) the BT antenna and click Run BER Test.

Results



Bluetooth LOCALS

BT Software Operational Mode: Normal

Scan Mode
☐ Inquiry Mode
☐ Page Mode

Bit Error Rate (BER) Tests

Bit Frames: 300

Hop Mode: Europe/USA

Counterpart BT Device Address: 0002ee297015

Bit Error Rate Test Results

Test Done:	OK
Number of Bits	64800
%Bit Error Rate:	0.00%
Result:	OK

Self Tests

Self Test Name	Result
ASIC-Data RAM	Unknown
Flash	Unknown
ASIC-REG access	Unknown
RF-Harmonic alignment	Unknown

Version Information

Checksum	z9
Hardware Version	0228

Figure 158 Phoenix settings for Bluetooth troubleshooting

Troubleshooting Bluetooth

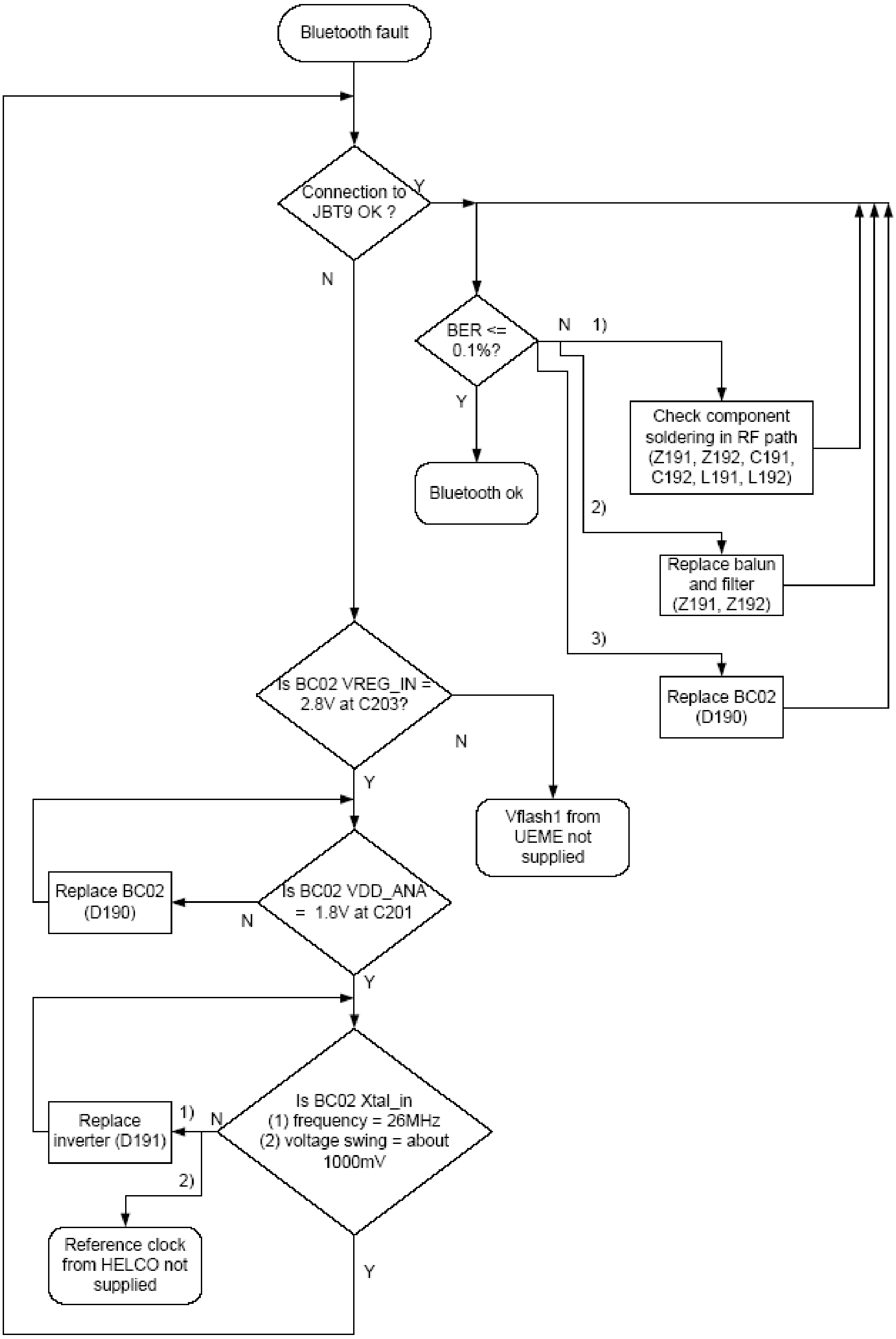

Bluetooth fault
Connection to JBT9 OK ?
Y
N
BER <= 0.1%?
N
1)
Y
Bluetooth ok
Check component soldering in RF path (Z191, Z192, C191, C192, L191, L192)
2)
Replace balun and filter (Z191, Z192)
3)
Replace BC02 (D190)
Is BC02 VREG_IN = 2.8V at C203?
N
Y
Vflash1 from UEME not supplied
Replace BC02 (D190)
N
Is BC02 VDD_ANA = 1.8V at C201
Y
Replace inverter (D191)
1)
N
2)
Is BC02 Xtal_in (1) frequency = 26MHz (2) voltage swing = about 1000mV
Reference clock from HELCO not supplied
Y

Figure 159 Bluetooth troubleshooting

8 — Camera module troubleshooting

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Introduction to camera module troubleshooting

Background, tools and terminology

Faults or complaints in camera operation can be roughly categorised into three subgroups:

1. Camera is not functional at all; no image can be taken.
2. Images can be taken but there is nothing recognizable in them.
3. Images can be taken and they are recognizable but for some reason the quality of images is seriously degraded.

Image quality is very hard to measure quantitatively, and even comparative measurements are difficult (comparing two images) to do, if the difference is small. Especially if the user is not satisfied with his/her device's image quality, and tells, for example, that the images are not sharp, it is fairly difficult to accurately test the device and get an exact figure which would tell whether the device is functioning properly.

Often subjective evaluation has to be used for finding out if a certain property of the camera is acceptable or not. Some training or experience of a correctly operating reference device may be needed in order to detect what actually is wrong.

It is easy for the user to take bad images in bad conditions. Therefore the camera operation has to be checked always in constant conditions (lighting, temperature) or by using a second, known-to-be good device as reference.

When checking for possible errors in camera functionality, knowing what error is suspected significantly helps the testing by narrowing down the amount of test cases. The following types of image quality problems may be expected to appear:

- Dust (black spots)
- Lack of sharpness
- Bit errors

Terms

Dynamic range	Camera's ability to capture details in dark and bright areas of the scene simultaneously.
Exposure time	Camera modules use silicon sensor to collect light and for forming an image. The imaging process roughly corresponds to traditional film photography, in which exposure time means the time during which the film is exposed to light coming through optics. Increasing the time will allow for more light hitting the film and thus results in brighter image. The operation principle is exactly the same with silicon sensor, but the shutter functionality is handled electronically i.e. there is no mechanical moving parts like in film cameras.
Flicker	Phenomenon, which is caused by pulsating in scene lighting, typically appearing as wide horizontal stripes in an image.
Noise	Variation of response between pixels with same level of input illumination.
Resolution	Usually the amount of pixels in the camera sensor; for example, RM-1 has a 1280 x 960 pixel sensor resolution. In some occasions the term resolution is used for describing the sharpness of the images.
Sensitivity	Camera module's sensitivity to light. In equivalent illumination conditions, a less sensitive camera needs a longer exposure time to gather enough light in forming a good image. Analogous to ISO speed in photographic film.

Sharpness	Good quality images are 'sharp' or 'crisp', meaning that image details are well visible in the picture. However, certain issues, such as non-idealities in optics, cause image blurring, making objects in picture to appear 'soft'. Each camera type typically has its own level of performance.

The effect of image taking conditions on image quality

There are some factors, which may cause poor image quality, if not taken into account by the end user when shooting images, and thus may result in complaints. The items listed are normal to camera operation and are not a reason for changing the camera module.

Distance to target

The lens in the module is specified to operate satisfactorily from 40 cm to infinite distance of scene objects. In practice, the operation is such that close objects may be noticed to get more blurred when distance to them is shorter than 40 cm. The lack of sharpness is first visible in full resolution images. If observing just the viewfinder, even very close objects may seem to appear sharp.

Sharpness of picture edges

The lens performance degrades in image edges, and generally the image is sharpest in the center part. Particularly this applies to distant objects (> 1 meter).

See the following figure.

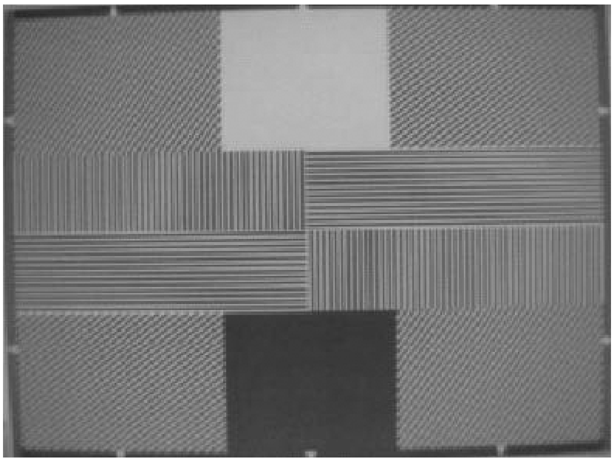


Figure 160 Picture sharpness is worse on the edges than in the center

Geometrical distortion

The camera lens causes some amount of so called barrel distortion in images.

In practice, this appears as bending of straight objects on the edges of an image. See figure Blurring caused by shaking hands (Page 8–7) (wall in the background).

The amount of light available

In dim conditions camera runs out of sensitivity. The exposure time is long (especially in the night mode) and the risk of getting shaken (= blurred) images increases. In addition, image noise level grows. The maximum exposure time in the night mode is ¼ seconds. Therefore, images need to be taken with extreme care and by supporting the phone when the amount of light reflected from the target is low. Because of the longer exposure time and larger gain value, noise level increases in low light conditions. Sometimes blurring may even occur in daytime, if the image is taken very carelessly. See the figure below for an example.

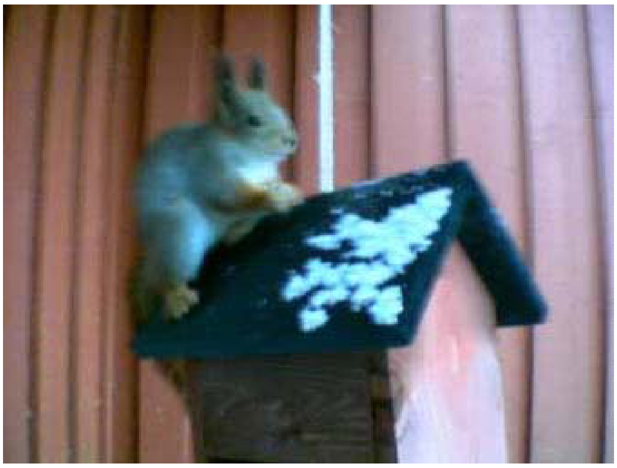


Figure 161 Blurring caused by shaking hands. Geometrical barrel distortion in the background.

Movement in bright light

If an image is taken of moving objects or if the device is used in a moving vehicle, object 'skewing' or 'tilting' may occur. This phenomenon is fundamental to most CMOS camera types, and usually cannot be avoided. The movement of camera or object sometimes cause blurring indoors or in dim lighting conditions because of long exposure time.

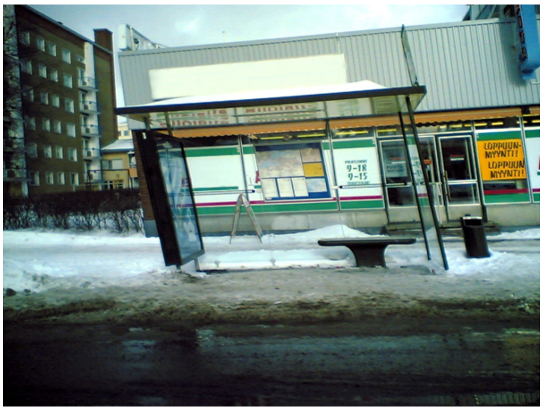


Figure 162 Near objects get skewed when taking images from a moving vehicle

Temperature

High temperatures inside the mobile phone cause more noise to appear in images. For example, in +70 degrees (Celsius), the noise level may be very high, and it further grows if the conditions are dim. If the phone processor has been heavily loaded for a long time before taking an image, the phone might have considerably higher temperature inside than in the surrounding environment. This is also normal to camera operation; do not change the camera module.

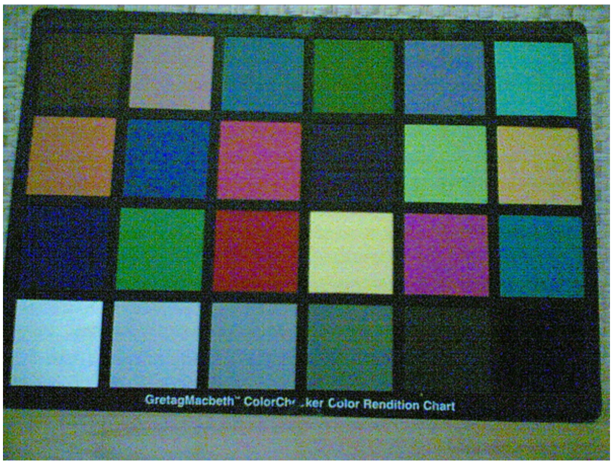


Figure 163 Noisy image taken in +70 degrees Celsius

Phone display

If the display contrast is set too dark, the image quality degrades: the images may be very dark depending on the setting. If the display contrast is set too bright, image contrast appears bad and "faint". This problem is solved by setting the display contrast correctly.

Basic rules of photography (especially shooting against light)

Because of dynamic range limitations, taking images against bright light might cause either saturated image or the actual target appear too dark. In practice, this means that when taking an image indoors and having, for example, a window behind the object, the result is usually poor.

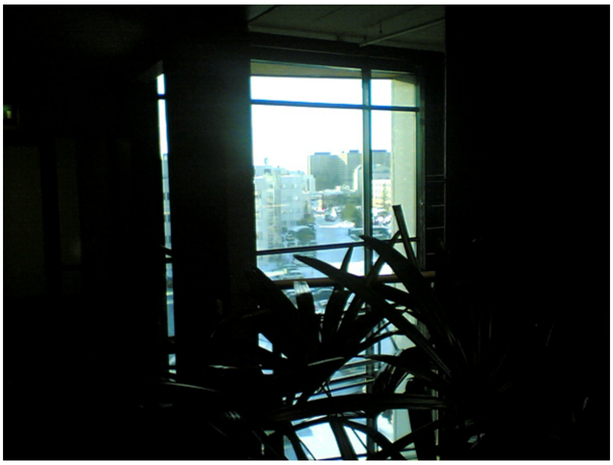


Figure 164 Image taken against light

Flicker

In some occasions a bright fluorescent light may cause flicker in the viewfinder and captured image. This phenomenon may also be a result, if images are taken indoors under the mismatch of 50/60 Hz electricity network frequency. The electricity frequency used is automatically detected by the camera module. In some very few countries, both 50 and 60 Hz networks are present and thus probability for the phenomenon increases. Flickering occurs also under high artificial illumination level.

Figure 165 Flicker in an image; object illuminated by strong fluorescent light

Bright light outside of image view

Especially the sun can cause clearly visible lens glare phenomenon and poor contrast in images. This happens because of undesired reflections inside the camera optics. Generally this kind of reflections are common in all optical systems.

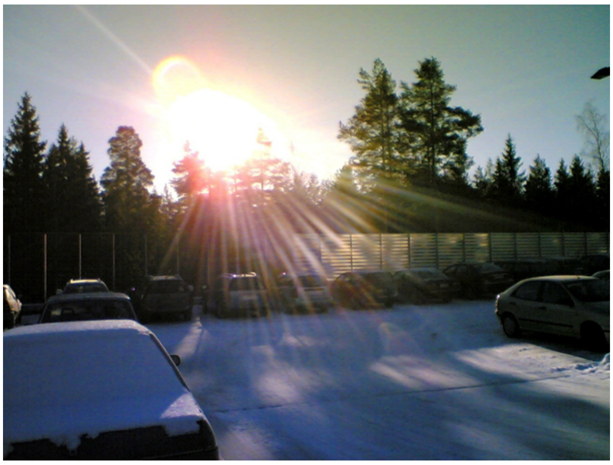


Figure 166 A lens reflection effect caused by sunshine

Examples of good quality images

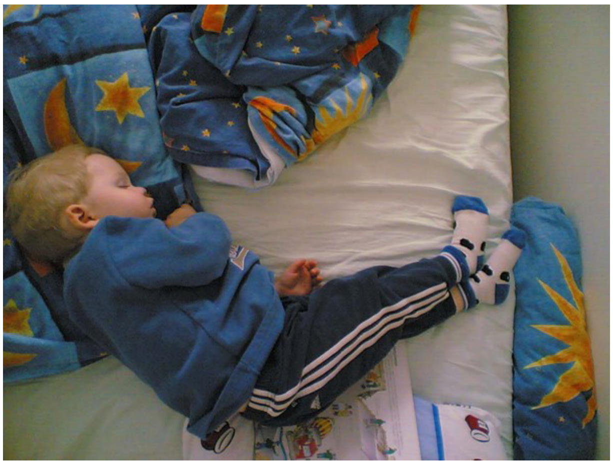


Figure 167 Good image taken indoors

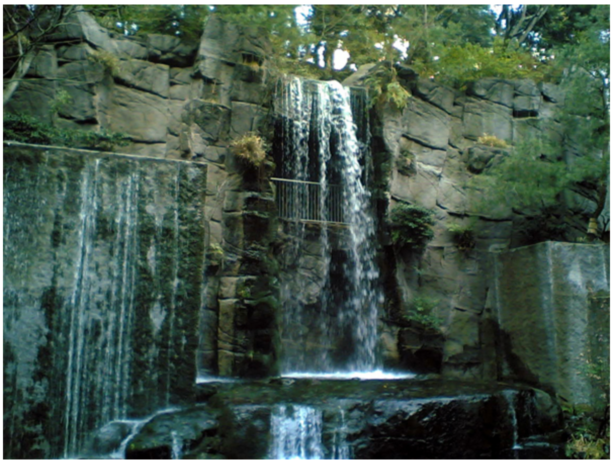


Figure 168 Good image taken outdoors

■ Image quality analysis

Testing for dust in camera module

Context

For detecting these kinds of problems, take an image of a uniform white surface and analyse it in full resolution. A good quality PC monitor is preferred for analysis. Search carefully, since finding these defects is not always easy. Figure Effects of dust on optical path (Page 8–11) is an example of an image containing easily detectable dust problems.

When taking a white image, use uniformly lightened white paper or white wall. One possibility is to use uniform light but in this case make sure that the camera image is not flickering when taking the test image. In case flickering happens, try to reduce illumination level. Use JPEG image format for analysing, and set the image quality parameter to ‘High Quality’.

Black spots in an image are caused by dirt particles trapped inside the optical system. Clearly visible and sharp edged black dots in an image are typically dust particles on the image sensor. These spots are searched for in the manufacturing phase, but it is possible that the camera body cavity contains a particle, which may move onto the image sensor active surface, for example, when the phone is dropped. Thus it is also possible that the problem will disappear before the phone is brought to service. The camera should be replaced if the problem is present when the service technician analyses the phone.

If a dust particle is lying on the infrared filter surface on either side, they are hard to locate because they are out of focus, and appear in the image as large, grayish and fading-edge 'blobs'. Sometimes they are invisible to the eye, and thus the user probably does not notice them at all. However, it is possible that a larger particle disturbs the user, causing need for service.

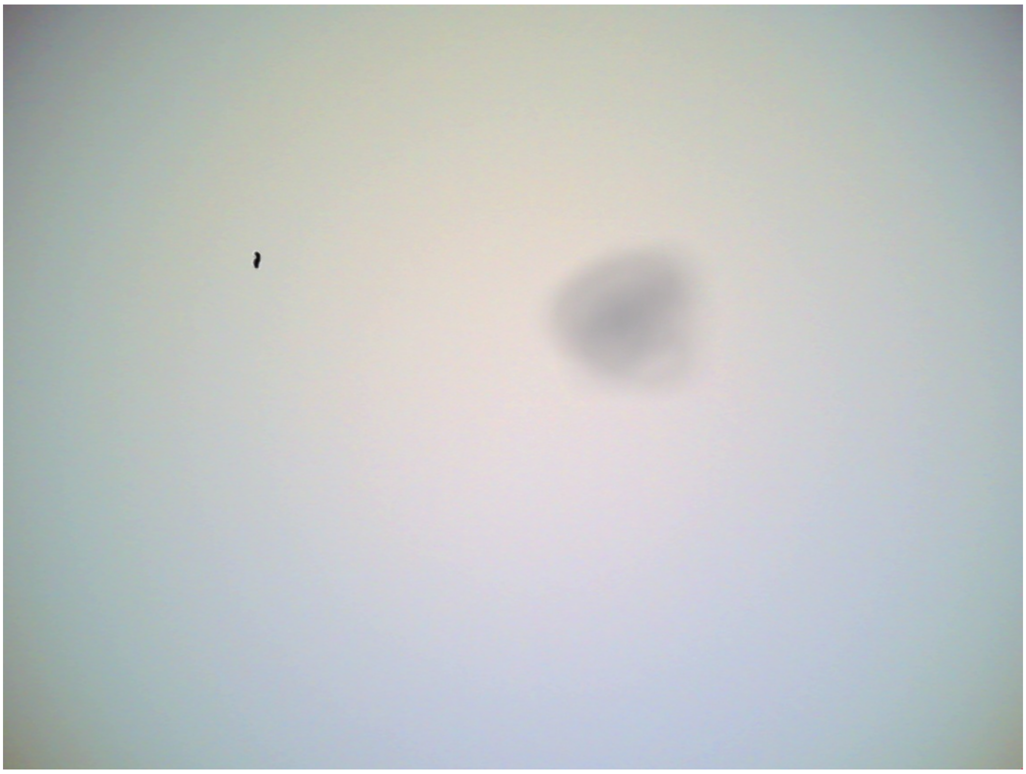


Figure 169 Effects of dust on optical path

If large dust particles get trapped on top of the lens surface in the cavity between camera window and lens, they will cause image blurring and poor contrast. The dust gasket between the window and lens should prevent any particles from getting into the cavity after the manufacturing phase.

If dust particles are found on the sensor, this is classified as a manufacturing error of the module and the camera should be replaced. Any particles inside the cavity between the protection window and lens have most probably been trapped there in the assembly phase at a Nokia factory. Unauthorized disassembling of the product can also be the root of the problem. However, in most cases it should be possible to remove the particle(s) by using clean compressed air. Never wipe the lens surface before trying compressed air; the possibility of damaging the lens is substantial. Always check the image sharpness after removing dust.

See Also

- Testing camera image sharpness (Page)

Testing camera image sharpness

Context

If pictures taken with a device are claimed to be blurry, there are six possible sources for the problem:

1 The protection window is fingerprinted, soiled, dirty, visibly scratched or broken.

2 The photographed object is too close – the camera lens operates with distances from 40 cm to infinity. This is no cause to replace camera module.

3 User has tried to take pictures in too dark conditions, and images are blurred due to handshake or movement. This is no cause to replace camera module.

4 There is dirt between the protection window and camera lens.

5 The protection window is defective. This can be either a manufacturing failure or caused by the user. The window should be changed.

6 The camera lens is misfocused because of a manufacturing error.

A quantitative analysis of sharpness is very difficult to conduct in any other environment than optics laboratory. Therefore, subjective analysis should be used.

If no visible defects (items 1-4) are found, a couple of test images should be taken. Generally, a well-illuminated typical indoor scene.

- The protection window has to be clean.
- The amount of light (300 – 600 lux (bright office lighting)) is sufficient.
- The scene should contain, for example, small objects for checking sharpness. Their distance should be 1 – 2 meters.
- If possible, compare the image to another image of the same scene, taken with a different device. Note that the reference device has to be a similar Nokia phone.

Steps

1. Take several images of small objects in the distance of 1-2 metres.
2. Analyse the images on a PC screen at 100% scaling with the reference images.

   Pay attention to the computer display settings: at least 65000 colors (16-bit) have to be used. True colour (24-bit, 16 million colours) or 32-bit (full colour) setting is recommended.

Next action

If there appears to be a clearly noticeable difference between the reference image and the test images, the module might have a misfocused lens -> change the module.

Re-check the resolution after changing the camera module.

If the changed module produces the same result, the fault is probably in the camera window. Check the window by looking carefully through it when replacing the module.

Image bit errors

Bit errors are image defects caused by data transmission errors between the camera module and the phone baseband and/or errors inside the module.

Usually bit errors can be easily detected in images, and they are best visible in full resolution images. A good practice is to use a uniform white test target when analysing these errors. The errors are clearly visible, colourful sharp dots or lines in camera images. See the following figure.

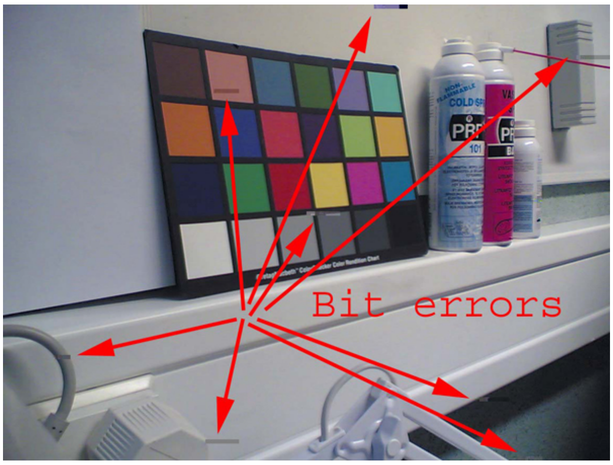


Figure 170 Bit errors caused by JPEG compression

One type of bit error is a lack of bit depth. In this case, the image is almost totally black under normal conditions, and only senses something in very highly illuminated environments. Typically this is a contact problem between the camera module and the phone main PWB. You should check the camera assembly and connector contacts.

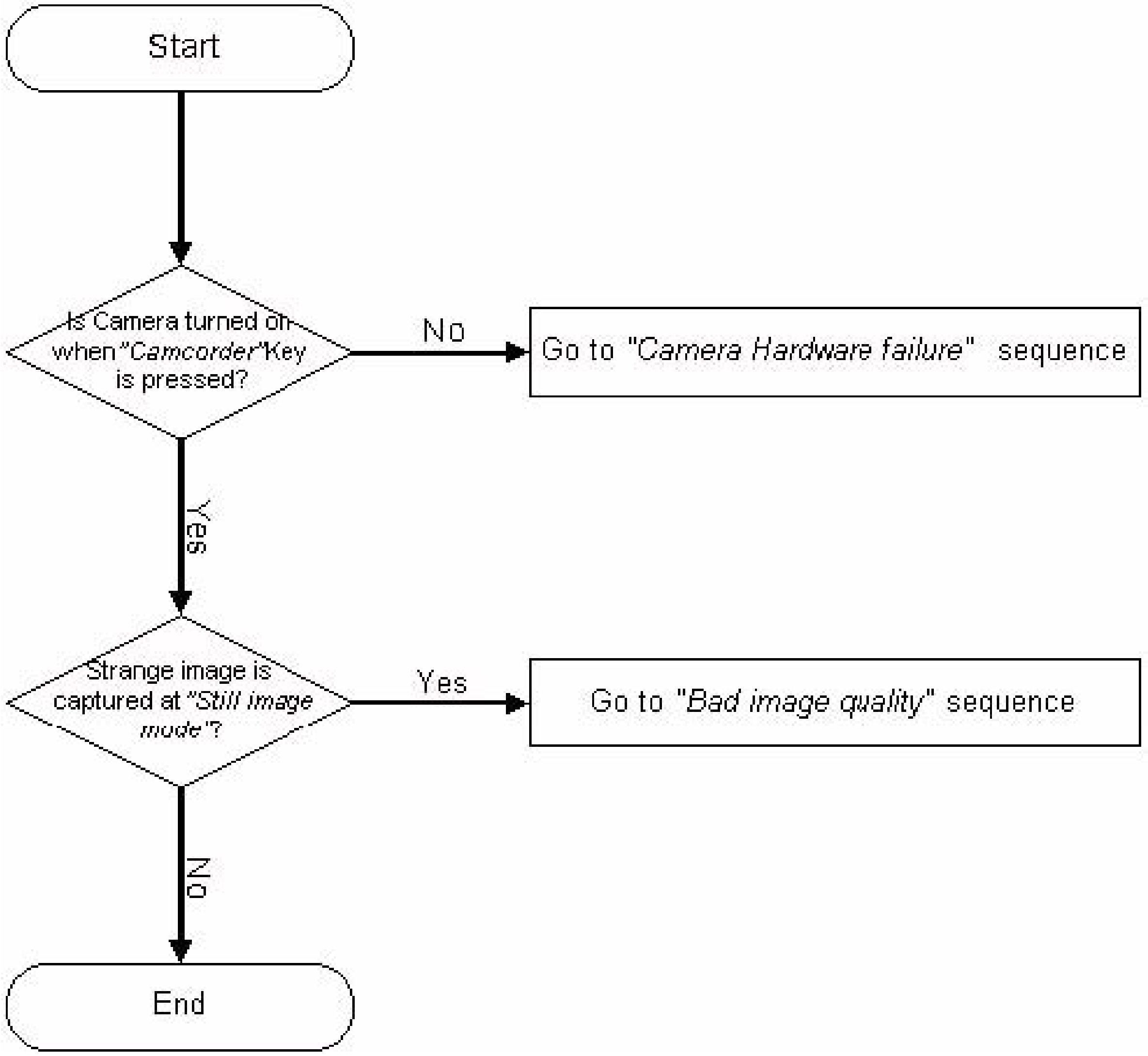
If the fault is in the camera module, bit errors are typically visible only when using some specific image resolution. For example, in case of a viewfinder fault, the error might exist but is not visible in a full size image.

Camera troubleshooting flowcharts

Camera hardware troubleshooting

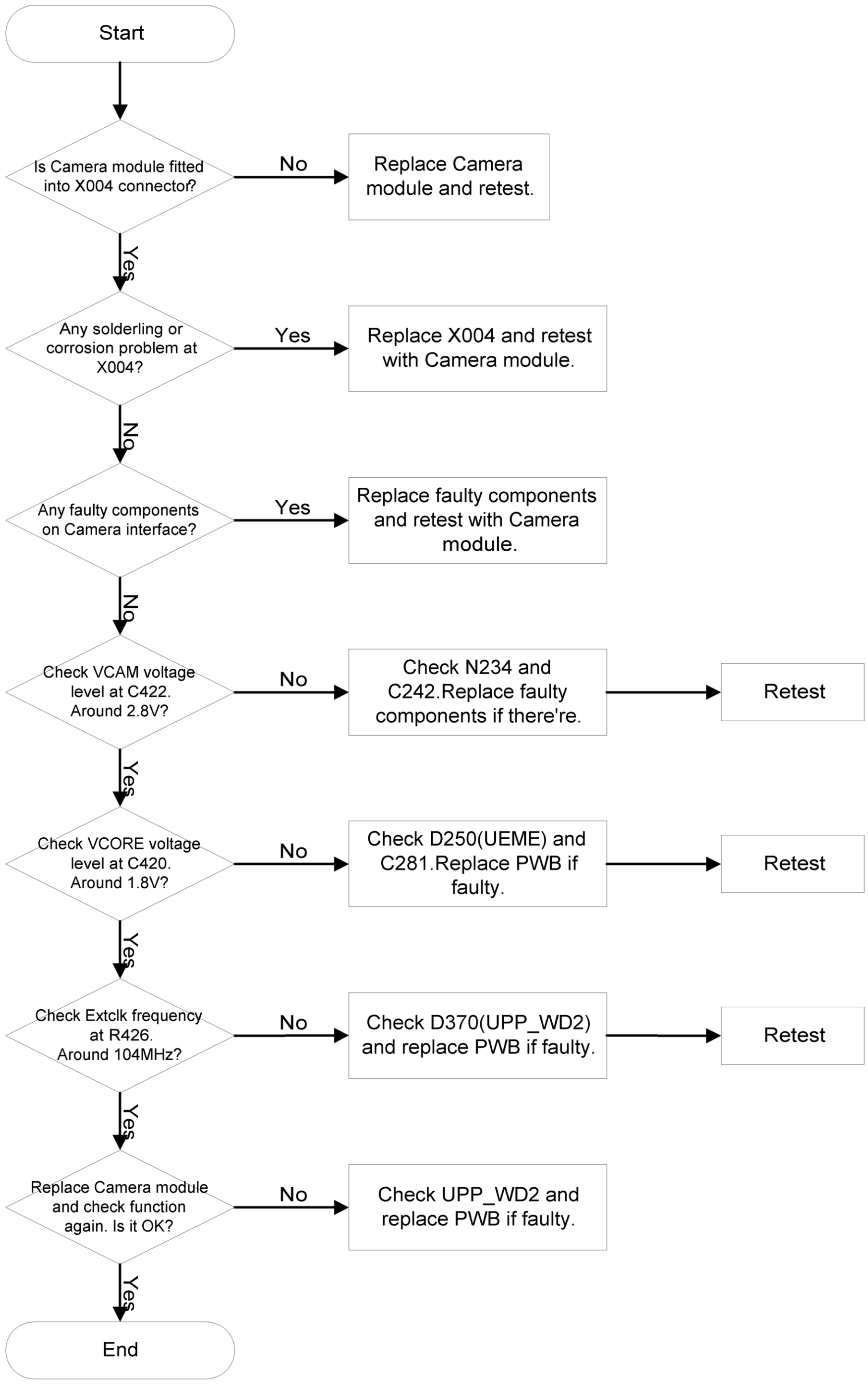
Context

If camera related hardware is faulty, follow the troubleshooting flowchart below.

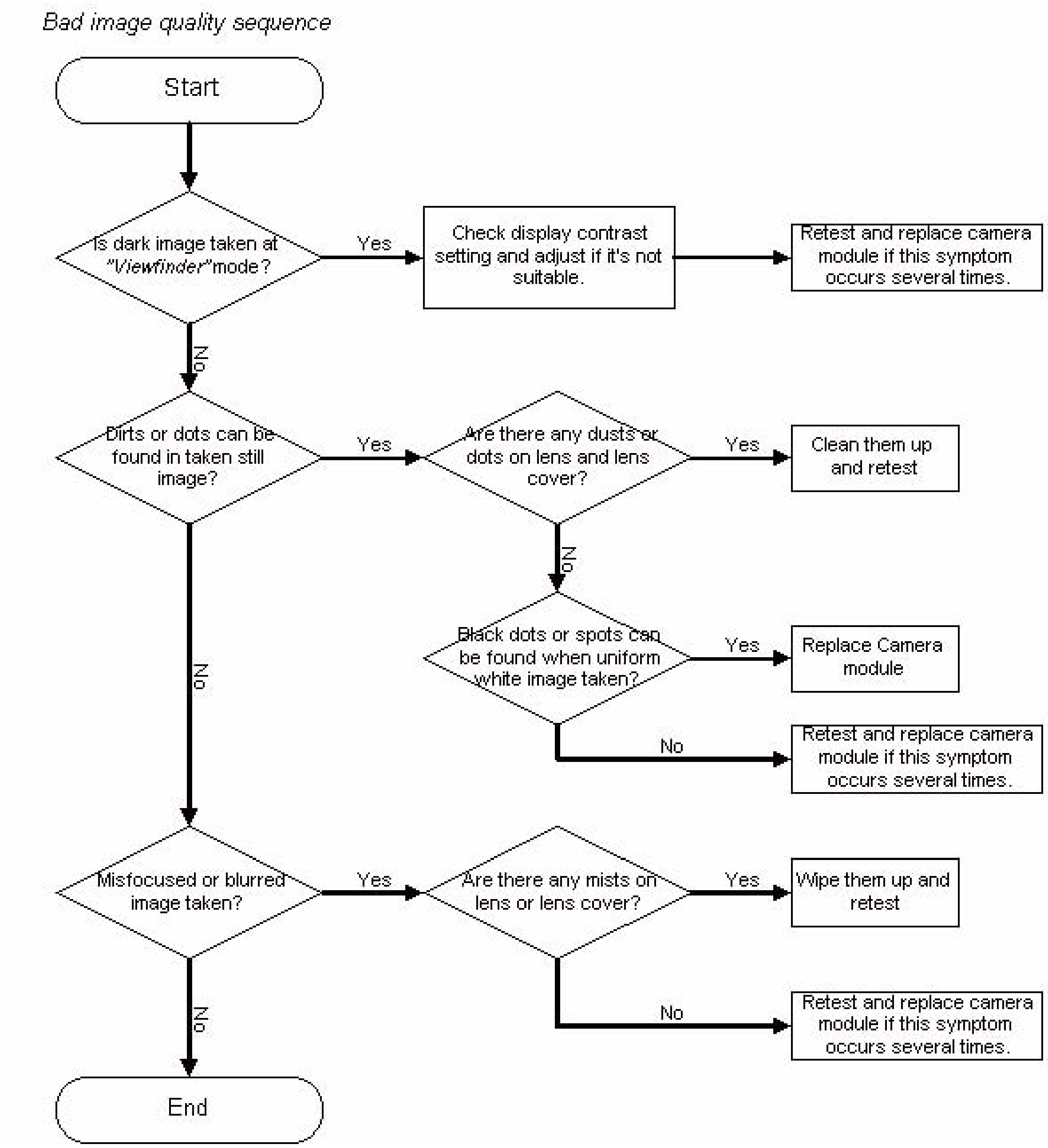

Start
Is Camera turned on when "Camcorder" Key is pressed?
No
Go to "Camera Hardware failure" sequence
Yes
Strange image is captured at "Still image mode"?
Yes
Go to "Bad image quality" sequence
No
End

Camera hardware failure troubleshooting

Hardware failure sequence


Start
Is Camera module fitted into X004 connector?
No
Replace Camera module and retest.
Yes
Any solderling or corrosion problem at X004?
Yes
Replace X004 and retest with Camera module.
No
Any faulty components on Camera interface?
Yes
Replace faulty components and retest with Camera module.
No
Check VCAM voltage level at C422. Around 2.8V?
No
Check N234 and C242.Replace faulty components if there're.
Retest
Yes
Check VCORE voltage level at C420. Around 1.8V?
No
Check D250(UEME) and C281.Replace PWB if faulty.
Retest
Yes
Check Extclk frequency at R426. Around 104MHz?
No
Check D370(UPP_WD2) and replace PWB if faulty.
Retest
Yes
Replace Camera module and check function again. Is it OK?
No
Check UPP_WD2 and replace PWB if faulty.
Yes
End

Bad image quality troubleshooting


Bad image quality sequence
Start
Is dark image taken at "Viewfinder" mode?
Yes
Check display contrast setting and adjust if it's not suitable.
Retest and replace camera module if this symptom occurs several times.
No
Dirts or dots can be found in taken still image?
Yes
Are there any dusts or dots on lens and lens cover?
Yes
Clean them up and retest
No
Black dots or spots can be found when uniform white image taken?
Yes
Replace Camera module
No
Retest and replace camera module if this symptom occurs several times.
No
Misfocused or blurred image taken?
Yes
Are there any mists on lens or lens cover?
Yes
Wipe them up and retest
No
Retest and replace camera module if this symptom occurs several times.
No
End

9 — System module and user interface

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System module block diagram

The main board consists of a radio frequency part and a baseband part. The User Interface parts are mainly situated at the UI board, which is connected to the main board through a flex.

The 1KMA is the system module of the mobile device.

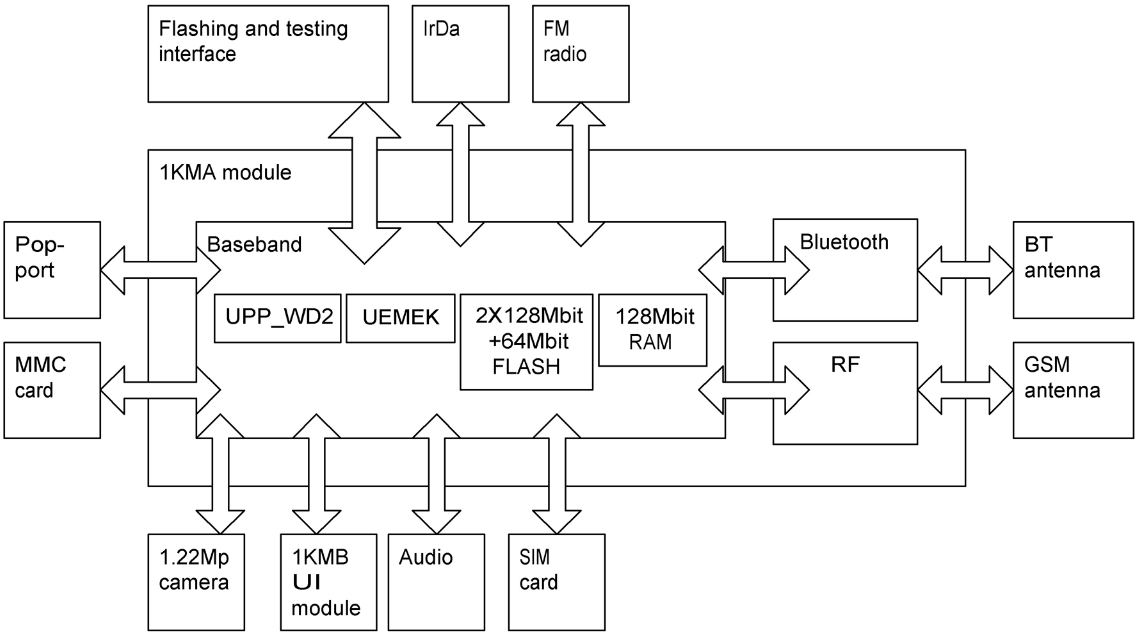
Flashing and testing interface
IrDa
FM radio
1KMA module
Pop-port
Baseband
MMC card
UPP_WD2
UEMEK
2X128Mbit +64Mbit FLASH
128Mbit RAM
Bluetooth
RF
BT antenna
GSM antenna
1.22Mp camera
1KMB UI module
Audio
SIM card

Figure 171 Module block diagram

The mobile has IrDA and Bluetooth wireless local interfaces. It features all PopPortTM ™ functions, like USB, except for FBUS. The port includes stereo audio interface and ACI bus, accessory control interface, support. The hardware will communicate with a list of ACI accessories.

ACI is implemented in the phone through BSI, Battery Size Indication, which is a little different from most Nokia phones.l

Functional description

The heart of the BB is UPP_WD2, which includes the MCU, DSP and Digital Control Logic. Power is supplied by the UEMEK ASIC and a number of discrete regulators. Memory comprises of 2 x 128 Mbit Stacked and 64 Mbit flash memory devices and 128 Mbit SDRAM.

There are three audio transducers; 8 mm earpiece, 16 mm IHF speaker and microphone. The IHF speaker is also used to handle the ring tone. The IHF speaker is driven by a separate audio amplifier. There is only one microphone for both HS and IHF modes.

For data connectivity there is USB v2.0 full-speed, Bluetooth and RS-MMC card.

The display is an TFT type colour display with 65536 colours and 176x208 pixels with backlighting. The UI module features a function keymat with a 4-way navigation key with a centre selection key.

For imaging purposes, BB supports a VGA camera via the CCP interface, which is integrated in UPP_WD2.

BB description

The BB core is based on UPP_WD2 CPU, which is a PDA version of the DCT4 UPP ASIC. UPP_WD2 takes care of all the signal processing and operation controlling tasks of the mobile device as well as all PDA tasks.

For power management, there is one main ASIC for controlling charging and supplying power UEMEK plus some discrete power supplies. The main reset for the system is generated by the UEMEK.

The interface to the RF and audio sections is also handled by the UEMEK. This ASIC provides A/D and D/A conversion of the in-phase and quadrature receive and transmit signal paths and also A/D and D/A conversions of received and transmitted audio signals. Data transmission between UEMEK and RF and the UPP_WD2 is implemented using different serial connections (CBUS, DBUS and RFBUS). Digital speech processing is handled by UPP_WD2 ASIC.

A real time clock function is integrated into UEMEK, which utilizes the same 32kHz-clock source as the sleep clock. A rechargeable battery provides backup power to run the RTC when the main battery is removed. Backup time is approximately 5 Hours.

Memory configuration

This mobile uses two kinds of memories, Flash and Synchronous DRAM (SDRAM). These memories have their own dedicated bus interfaces to UPP_WD2.

SDRAM is used as the working memory. Interface is 16 bit wide data and 14 bit address. Memory clocking speed is 123.5 MHz. The SDRAM size is 128Mbits.

SDRAM I/O is 1.8 V and core 1.8 V supplied by UEMEK regulator VIO. All memory contents are lost if the supply voltage is switched off.

Multiplexed flash memory interface is used to store the MCU program code and user data. The memory interface is a burst type FLASH with multiplexed address/data bus, running at 123.5/13MHz.

Configuration of flash memory is a 2x128Mbit stacked flash memory and a 64Mbit flash memory.

Both flash I/O and core voltage are 1.8 V supplied by UEMEK’s VIO.

Energy management

The master of EM control is UEMEK and with SW it has the main control of the system voltages and operating modes.

Modes of operation

The mobile device employs several hardware and software controlled operation modes. Main modes are described below.

- NO_SUPPLY mode means that the main battery is not present or its voltage is too low (below UEMEK master reset threshold) and back-up battery voltage is too low.
- In BACK_UP mode the main battery is not present or its voltage is too low but the back-up battery has sufficient charge in it.
- In PWR_OFF mode the main battery is present and its voltage is over the UEMEK master reset threshold. All regulators are disabled.
- RESET mode is a synonym for start-up sequence and contains in fact several modes. In this mode, regulators and oscillators are enabled and after they have stabilized system reset is released and PWR_ON mode entered.
- In PWR_ON mode SW is running and controlling the system.
- SLEEP mode is entered from PWR_ON mode when the system’s activity is low (SLEEPX controlled by SW).
- FLASHING mode is for production SW download.

Voltage limits

The voltage limits of the system are listed in the following table. These are also controlling system states.

Parameter	Description	Value
VMSTR+	Master reset threshold (rising)	2.1 V (typ.)
VMSTR-	Master reset threshold (falling)	1.9 V (typ.)
VCOFF+	Hardware cutoff (rising)	3.1 V (typ.)
VCOFF-	Hardware cutoff (falling)	2.8 V (typ.)
V_BUCOFF+	Back-up battery cutoff (rising)	2.1 V (typ.)
V_BUCOFF-	Back-up battery cutoff (falling)	2.0 V (typ.)
SWCOFF	SW cutoff limit (> regulator drop-out limit) MIN!	3.3 V SW changeable

The master reset threshold controls the internal reset of UEMEK. If battery voltage is above VMSTR, UEMEK's charging control logic is alive. Also, RTC is active and supplied from the main battery. Above VMSTR UEMEK allows the system to be powered on although this may not succeed due to voltage drops during start-up. SW can also consider battery voltage too low for operation and power down the system.

■ Clocking scheme

A 26 MHz VCXO, voltage controlled crystal oscillator, is used as system clock generator in GSM. During the system start-up, UEMEK RC-oscillators generate timing for state machines. All clock signals of the engine are illustrated in following figure.

Bluetooth uses a 26 MHz clock.

FM radio uses 32.768 kHz, the SleepClk.

In SLEEP mode, the VCXO is off. UEMEK generates a low frequency clock signal, the sleep clock at 32.768 kHz, that is fed to UPP_WD2, Bluetooth and ZOCUS.

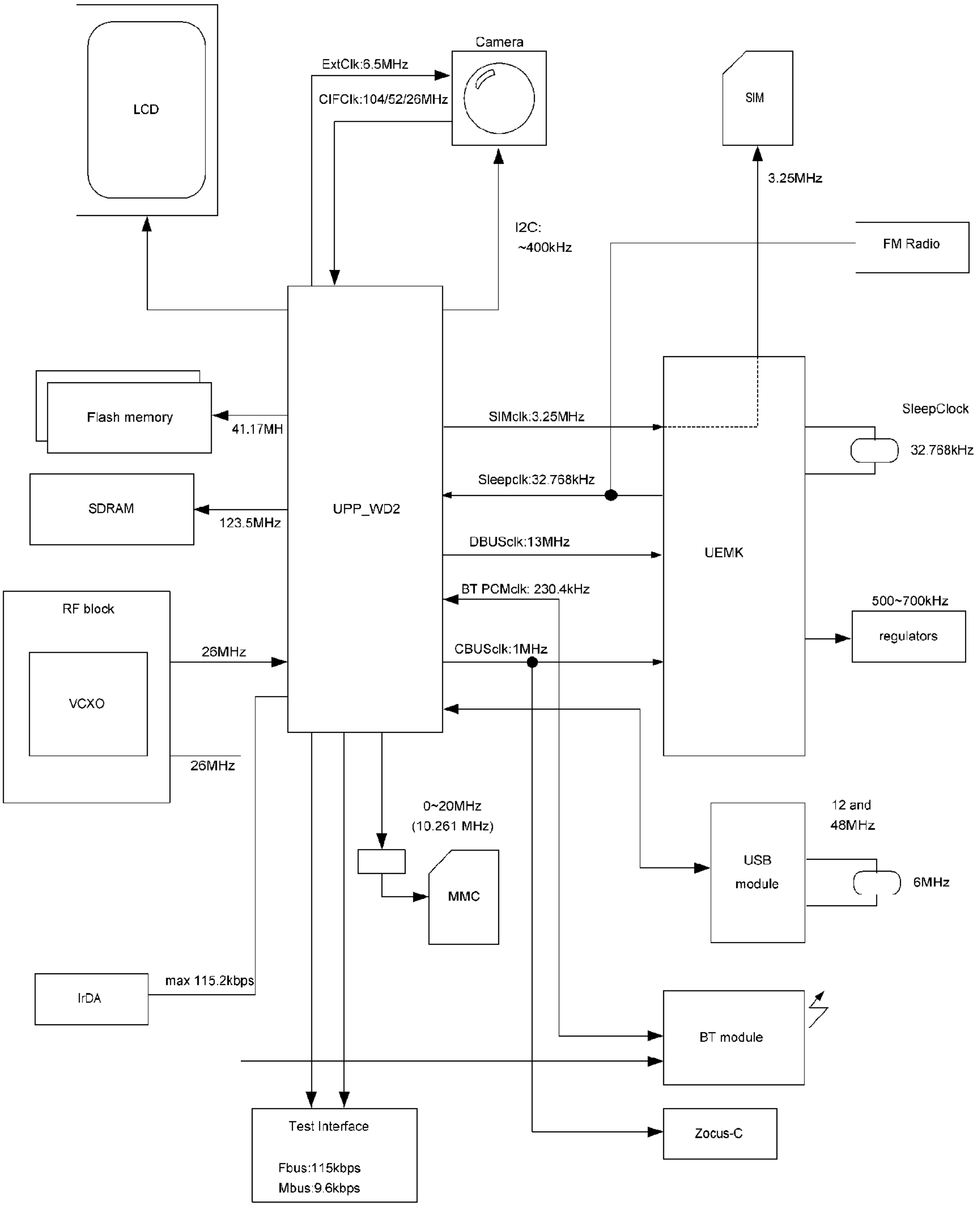
LCD
Camera
ExtClk:6.5MHz
CIFClk:104/52/26MHz
SIM
3.25MHz
I2C:
~400kHz
FM Radio
Flash memory
41.17MH
SDRAM
123.5MHz
UPP_WD2
SIMclk:3.25MHz
SleepClock
32.768kHz
Sleepclk:32.768kHz
DBUSclk:13MHz
UEMK
BT PCMclk: 230.4kHz
500~700kHz
regulators
RF block
VCXO
26MHz
CBUSclk:1MHz
26MHz
0~20MHz
(10.261 MHz)
MMC
USB
module
12 and
48MHz
6MHz
IrDA
max 115.2kbps
BT module
Test Interface
Fbus:115kbps
Mbus:9.6kbps
Zocus-C

Figure 172 The clocking scheme

UPP_WD2/clock frequency adjusting

No external clock is available for UPP_WD2 before VCXO starts. As reset is released, the VCXO is running and MCU uses the 26 MHz clock while DSP is in reset. There are three identical digital phase locked loops (DPLLs); for MCU, for DSP and for accessory interfaces, which can be controlled independently. The clock for MCU can be up to 123,5 MHz and 156 MHz is maximum clock frequency for the DSP. These clock signals are used either directly (SDRAM IF) or divided down for the interfaces (e.g. flash IF).

Power distribution, control and watchdogs

All power (except backup battery power) is drawn from the BL-5B Li-Ion battery. Current flows through ZOCUS current sense resistor, used for current measurement, and thus for remaining operating time estimation.

The discrete regulators consist of a SMPS to power the UPP_WD2 core, a SMPS to power the LCD backlightning and the keyboard LEDs, and two LDOs to deliver VCAM and VLCD respectively.

1KMA board contains one power ASIC, UEMEK and discrete regulators needed for generating the different operating voltages. The discrete regulators consist of an SMPS to power UPP_WD2 voltage core. In addition, there is a SMPS in 1KMA generating the operating voltage for display module backlighting. In 1KMA, the keyboard backlight is powered with a charge pump regulator.

A “soft watchdog” in UPP_WD2 is used to reset the chip in case software gets stuck for any reason.

Power-up sequence (reset mode)

RESET mode can be entered in four ways: by inserting the battery or charger, by RTC alarm or by pressing the power key (the VCXO is powered by UEMEK). After a 220 ms delay, regulators are configured and UEMEK enters PWR_ON mode and system reset (PURX) is released.

During the system start-up, in RESET state, the regulators are enabled, and each regulator charges the capacitors at the output with the maximum current (short circuit current) it can deliver. This results in battery voltage dropping during start-up. When a battery with a voltage level just above the hardware cutoff limit is inserted, the system may not start due to excessive voltage dropping. Dropping below 2.8 V for longer than 5 µs forces the system to PWR_OFF state.

Controlled powering off

Controlled powering off is done when the user requests it by pressing the power-key or when the battery voltage falls too low.

When pressing the power key, the power off sequence is activated in UEMEK and software. Basically, the power key causes UEMEK interrupt to UPP_WD2 and the software sets watchdog time value to zero. As this happens, the power-up reset (PURX) is forced low and all regulators are disabled.

If the battery voltage falls below the very last software cutoff level, the software will power off the system by letting the UEMEK’s watchdog elapse.

If thermal shutdown limit in the UEMEK regulator block is exceeded, the system is powered off and PURX is forced low.

Uncontrolled powering off

Uncontrolled powering off happens when the battery is suddenly removed or if an over-temperature condition is detected in the regulator block while in RESET mode. UEMEK’s state machine notices battery removal after the battery voltage has been below VCOFF- for 5 µs and enters PWR_OFF mode. Then PURX is set low and all UEMEK’s regulators are disabled immediately. Discrete regulators are disabled as VBAT supply goes low.

Watchdogs

There are three watchdogs in UEMEK.

The first one is for controlling system power-on and power-down sequences. It is used for powering the system off in a controlled manner. The initial time for this watchdog after reset is 32 s and it can not be disabled. The time can be set using a register.

The second one is for security block and is used during IMEI code setting.

The third one is a power key watchdog. It is used to power off the system in case software is stuck and the user presses the power key. This watchdog is software configurable.

Charging

Charging control and charge switch is in UEMEK. There are two different charging modes; charging an empty battery (start-up charge mode), and software controlled charging.

UEMEK digital part takes care of the charger detection (generates interrupt to UPP_WD2), pulse width modulated charging control (for internal charge switch) and over voltage and current detection. These are all controlled by software.

Chargers

The Baseband officially supports a standard charger (two wires); ACP-12 and cigarette charger LCH-12 .

Battery

The battery is a detachable, semi-fixed lithium-Ion BL-5B battery. The nominal voltage is 3.7 V (max 4.2 V).

The interface consists of three pins: VBAT, GND and BSI. A pull-down resistor inside the batteries (BSI signal) indicates the battery types. The voltage level (75kΩ for BL-5B) at BSI line is measured using UEMEK's AD-converter.

Back-up battery and real time clock

The real time clock (RTC), crystal oscillator (VCXO)and back-up battery circuitry reside in UEMEK. A register in UEMEK controls back-up battery charging. Charging is possible only in POWER_ON State.

Baseband measurement A/D converter

UEMEK contains an 11 channelled A/D converter, which is used for different baseband measurement purposes. The resolution of the A/D converter is 10 bits. The converter uses the CBUS interface clock signal for the conversion. An interrupt will be given to the MCU at the end of the measurements. The converter is used for the following purposes.

- VBATADC, battery voltage
- BSI (Battery Size Indicator), the input is connected to ACI bus and the BSI_PULS. The BSI_PULS is delivered by the flashing equipment when flashing the phone.
- BTEMP, battery temp
- PATEMP, power amplifier temp
- VCXOTEMP, power amplifier vendor indication
- Headint, interrupt from headset
- Hookint, interrupt from Hook button on headset
- The ALCO/LS input is used to determine the value of the BSI resisor of the Battery and thus the battery type (and local, test modes)
- Headint2, not supported by SW, not used
- AuxDet, not used
- VBACK, test the voltage of backup battery

ZOCUS

The ZOCUS device is a current sensor used for the battery bar display and for determining whether the mobile is in a high current consuming mode. The ZOCUS device measures the voltage drop across a sense resistor in the battery voltage line. This sense resistor is formed from a PWB track and is on an internal layer of the PWB. The sense resistor must be located close to the battery terminals so that all of the phones current flow through it. The nominal value of the sense resistor is 3.0mΩ. ZOCUS reports the current measurement to UPP_WD2 via the CBus interface.

BB user interface

UI-module interface

The UI module holds the display, the keyboard, the rocker switch and the camera.

Bluetooth

Bluetooth provides a fully digital link for communication between a master unit and one or more slave units. The system provides a radio link that offers a high degree of flexibility to support various applications and product scenarios. Data and control interface for a low power RF module is provided. Data rate is regulated between the master and the slave.

The bluetooth module used in this phone is BC02. The ASIC and components are placed on the top side of the 1KMA system module, underneath the shield can UPP_WD2, next to UEM D250.

USB

USB provides a wired connectivity between host PC and peripheral devices. The phone complies with USB 2.0, supporting data transfer at full-speed (max. 12Mbps). The USB functionality is implemented by a newly developed USB interface device, Kaede (D440), which is connected to UPP_WD2 via flash memory interfaces. A 6MHz ceramic resonator, Ceralock (B440), is used for USB clock generation.

SIM interface

The SIM interface is located in two chips (UPP_WD2 and UEMEK). In UEMEK there is support only for one SIM card. The interfaces support both 1.8 V and 3.0 V SIM cards. Adjustable SIM regulator (1.8V/3.0V) is located in UEMEK and can be controlled by the software.

The data communication between the card and the mobile device is asynchronous half duplex. The clock supplied to the card is 3.25 MHz. The data baud rate is the SIM card clock frequency divided by 372 (by default), 64, 32 or 16.

IrDA interface

This mobile device supports data connectivity via the Infra Red (IR) link. The IR interface is integrated into the UPP_WD2 and the main external component is the IR module. The data rates supported are up to 115.2 kbit/s.

The logics section is powered by 1V8 and VIO while the transmitter LED is powered directly by the battery via a power limiting resistor.

The maximum distance in the lightning configuration is approximately 20 centimetres (30 cm used with an accompanying 1 m device).

MMC interface

The MMC interface consists of a block in UPP_WD2 plus a level shifting device known as “Lester”. The level shifter is inserted between the UPP_WD2 and the MMC reader, and shifts from 1.8 V logical level at UPP to 2.85V logical level at the MMC reader.

The MMC interface comprises 3 lines clock, data and command and runs at 10.26 MHz.

Pop-Port^{TM}

The ACI bus is level-shifted between the accessory part and the BSI/DBI port of the UEMEK.

Parallel to this pin of the UEMEK is connected the Test/Flash pad BSI_PULS used when the phone is flashed.

The BSI connection of the battery, BSI_BATT pad of the Flsh/Test interface, is connected to the LS/ALCO AD input of the UEMEK. Via this A/D converter the Battery Size Indication (BSI)resistor value is determined.

The BSI connection of the battery is also connected to the SIMCardDet input of the UEMEK. When the BSI of the battery is disconnected the UEMEK will close the SIM bus down immediately, in a well-controlled manner.

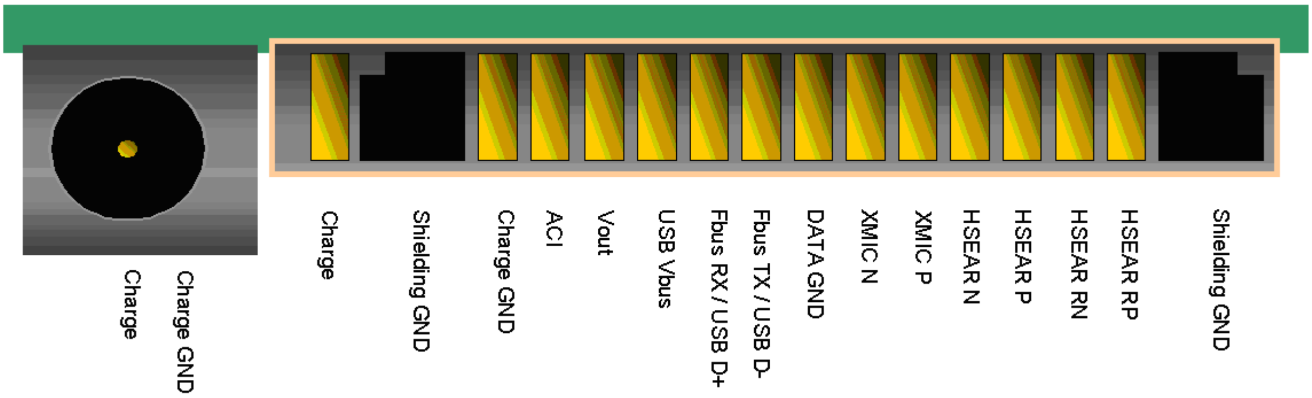
Charge
Charge GND
Charge
Shielding GND
Charge GND
ACI
Vout
USB Vbus
Fbus RX / USB D+
Fbus TX / USB D-
DATA GND
XMIC N
XMIC P
HSEAR N
HSEAR P
HSEAR RN
HSEAR RP
Shielding GND

Figure 173 PopPort™ bottom connector (charger plug socket & PopPort™ system connector

Table 12 System connector interface description

Pin #	Signal	Notes
1	VCHAR	
2	GND	Charge ground
3	ACI	Insertion & removal detection / Serial data bi-directional 1 kbit/s
4	Vout	Power supply for external accessories
5		Not used in this product
6	FBUS_RX	Serial data from accessory to phone /115 kbit/s
7	FBUS_TX	Serial data from phone to accessory /115 kbit/s
8	GND	Data ground
9	XMIC N	Negative audio in signal
10	XMIC P	Positive audio in signal
11	HSEAR N	Negative audio out signal (left channel)
12	HSEAR P	Positive audio out signal (left channel)
13	HSEAR RN	Negative audio out signal (right channel)

Pin #	Signal	Notes
14	HSEAR RP	Positive audio out signal (right channel)

Audio concept

The audio concept includes an earpiece, a microphone, and a Pop-Port™ connector for headset and integrated handsfree (IHF). Audio is based on ASIC's UPP_WD2, UEMEK and a discrete amplifier for the handsfree speaker known as “boomer”.

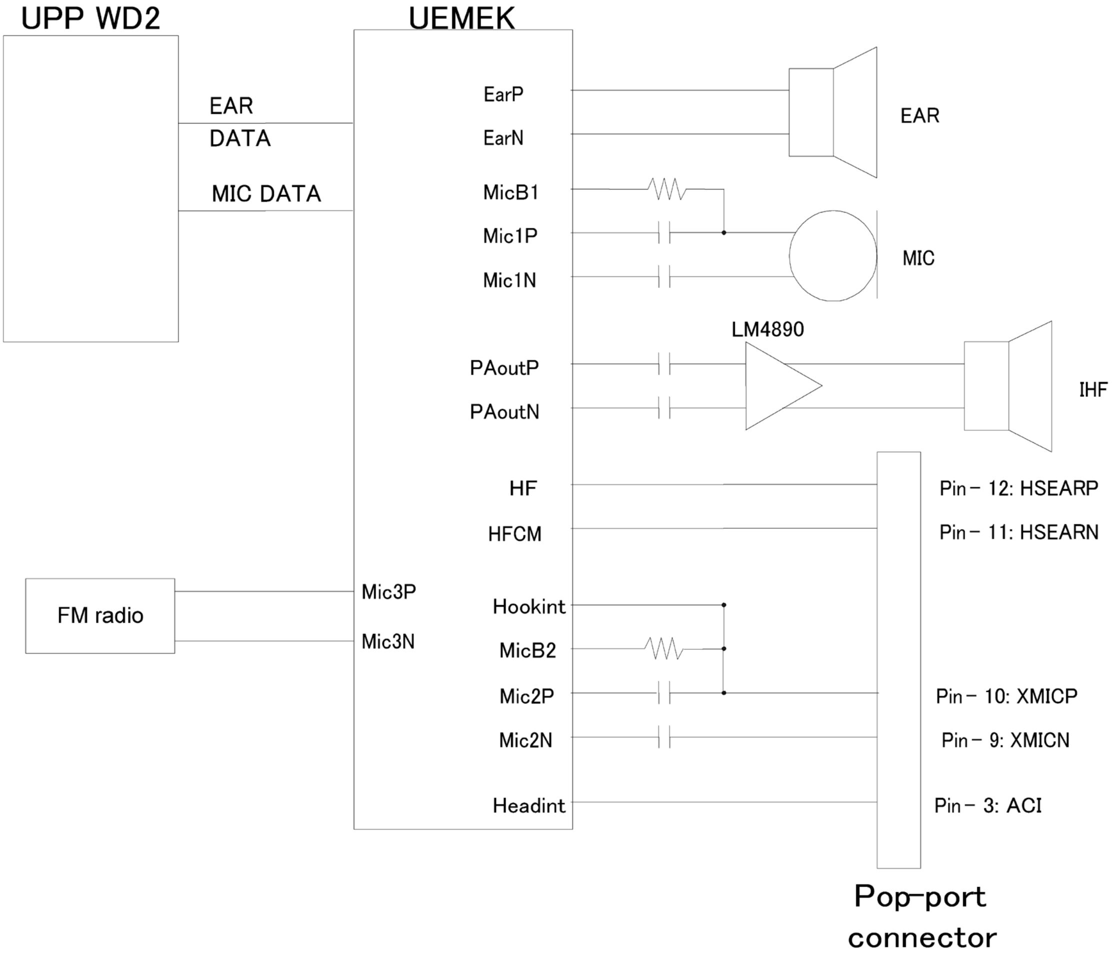
UPP WD2
UEMEK
EAR
DATA
MIC DATA
EarP
EarN
MicB1
Mic1P
Mic1N
PAoutP
PAoutN
HF
HFCM
Mic3P
Mic3N
Hookint
MicB2
Mic2P
Mic2N
Headint
FM radio
EAR
MIC
LM4890
IHF
Pin – 12: HSEARP
Pin – 11: HSEARN
Pin – 10: XMICP
Pin – 9: XMICN
Pin – 3: ACI
Pop-port
connector

Figure 174 Audio blocks

Between UPP_WD2 and UEMEK, the audio signals are transferred in digital format using signals MICDATA and EARDATA. Ringing tones and warning/info tones are to be produced to the IHF speaker.

Earpiece

The earpiece used in this mobile is an 8-mm Pico earpiece. It has 32 Ω continuous impedance and continuous power 8 mW. It is driven by differential signals from UEMEK (EARP & EARN). It makes contact with the PWB via spring contacts.

Microphone

The microphone module for this device is used Pop-Port^{TM} microphone module. Its sensitivity is -42dB Nominal. Contacts are done by springs.

Two inputs are used from UEMEK, one for the normal internal microphone and the other for the headset. The third microphone input is used for FM. Microphone bias block in UEMEK generates bias voltages for handportable and handsfree/headset microphones. For both microphone bias outputs (MICB1 & MICB2), the minimum output voltage is 2.0 V and maximum output current is 600 mA. Microphone bias block also includes a low pass filter for the reference voltage used as an input for the MICB1&2 amplifiers.

IHF amplifier and speaker

The speaker to be used in this mobile device is a 16-mm 8-Ω speaker. It can handle 0.3 W nominal power and short trem peak power of 0.8 W. The component is housed in the antenna housing and connects to the UI board via spring contacts.

PAOUTP and PAOUTN lines of UEMEK are use to drive Boomer amplifier for the speaker.

Power amplifier is a differential operational amplifier (opamp). The differential output drives the HandsFree speaker. HandsFree amplifier load impedance is 8 Ω.

The outputs go into a high impedance state when powered down. The amplifier can be enabled and shut down using a GENIO line from UPP_WD2.

Software controls IHF, headset and earpiece volume via UEMEK. Gain setting can be done in 2 dB steps, from –40 to +6 dB. The output sound pressure level of the Internal HandsFree speaker is controlled by software(CBus is used for controlling).

The supply voltage for the IHF amplifier is taken directly from the battery voltage.

External audio interface

This phone has a PopPort^{TM} connector with differential 4–wire audio connection.

The handsfree (HF) driver in UEMEK drives the headset in differential mode. The gain of the handsfree driver in the differential mode is 6 dB. The earpiece (EARP, EARN) and headset (HF, HFCM) signals are multiplexed so that the outputs can not be used simultaneously. The HF and HFCM amplifiers include a transient suppression circuitry, which prevents unwanted spikes in HF and HFCM outputs when switching on and off the amplifiers.

The HeadInt line will be pulled up to 2.7 V by the internal resistor when the accessory is not connected. When having the accessory inserted the voltage in the HeadInt line will be <0.8 V caused by internal pull down resistor in the HF line.

Camera interface

This mobile has a digital camera with viewfinder function. The resolution is 1.22 Mpixel. The camera module is connected by means of a connector on the UI board.

The camera interface is a serial CCP (compact camera port), which is an unidirectional interface; the control information to camera is transmitted through I2C bus. The I2C bus is implemented purely by the software using general purpose I/Os.

The CCP interface consists of differential clock and data signals. The CCP enables the use of high data rates with low EMI; maximum transfer capacity is 104Mbit/s.

The camera needs two power sources; 2.8V for analog circuit voltage VDD and 1.8V for digital circuit voltage VDDI. VDD is provided from a discrete regulator asVCAM and VDDI is fed from UEMEK’s Vcore.

FM radio

FM radio circuitry is implemented using the highly integrated FM radio ASIC, TEA5767. The MCU SW controls the FM radio circuitry through a proprietary 3-wire bus.

The stereo output is fed to the UEMEK via one of the microphone inputs, MIC3.

The antenna of the FM Radio is created with the headset. The wires of the headset are used as antenna.

The data bus on the radio will be disabled when not used, in order to save current (BUSENABLE).

The VAUX1 regulator of the UEMEK will power the FM radio at nominal 3 V.

The reference clock for the FM radio is the SleepClk signal picked up through a resistive divider.

Flashing

SW download in service is implemented by custom tools and SW; kindly refer to Phoenix service software instructions (Page 3–5) and Service Tools (Page) sections of the manual.

ACI/BSI implementation

The ACI bus is implemented a little different from most Nokia mobile devices. The functionality is the same but some functions have been moved a little around. The battery detect function is handled by connecting the BSI of the battery to the SimCardDet input of UEMEK. The Battery Size Indication functionality is handled by connecting the BSI of the battery to the Alco/LS AD input of the UEMEK. The ACI bus of the ACI accessories is fed via a level shifter to the BSI/BDI pin of the UEMEK. Via this pin the ACI accessory communicates over the C-bus with the MCU of the UPP_WD2. The BSI_PULS delivered at one of the Flash/Test pads by the Flash equipment when the mobile is to be reflashed is connected to the BSI pin of UEMEK. The ACI accessory is connected to HeadInt to interrupt the MCU when accessory is attached/detached.

Battery voltages

Lithium-Ion battery BL-5B (1 cell):

- Nominal voltage is 3.7 V
- Lower extreme voltage is 2.8 V (cut off voltage)
- Higher extreme voltage is 4.2 V (charging high limit voltage)

RF description

The RF module has 2 SAW filters, a capacitor on the 1KMA system module, and an antenna module.

The main ASIC of RF is Helgo 86G, and power amplifier is RFMD RF9250, a so called microPA. EDGE downlink is supported.

For more information, see the RF troubleshooting chapter.

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10 — Schematics

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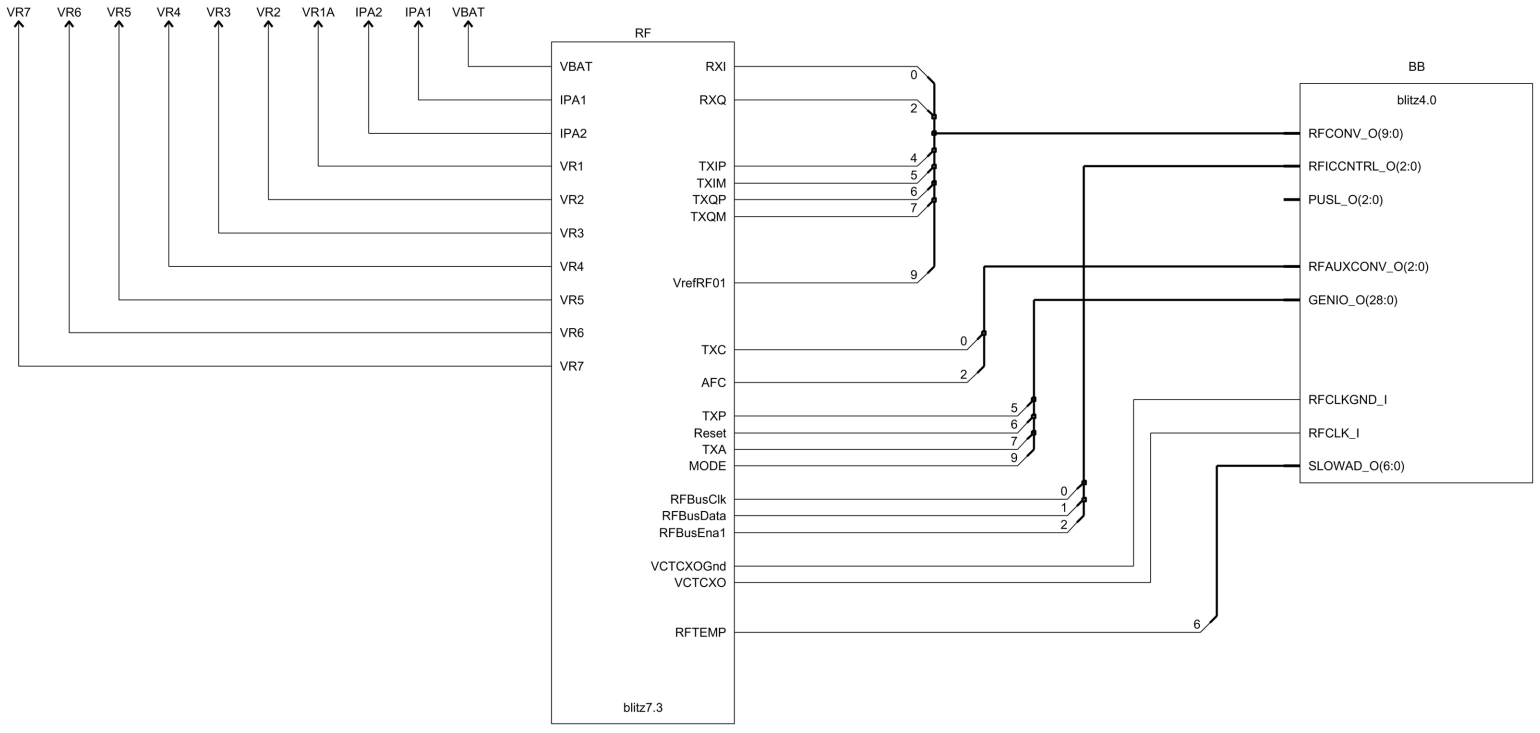
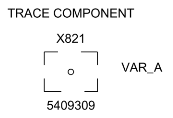
Version 5.0, Edit 82


VR7
VR6
VR5
VR4
VR3
VR2
VR1A
IPA2
IPA1
VBAT
RF
VBAT
IPA1
IPA2
VR1
VR2
VR3
VR4
VR5
VR6
VR7
RXI
RXQ
TXIP
TXIM
TXQP
TXQM
VrefRF01
TXC
AFC
TXP
Reset
TXA
MODE
RFBusClk
RFBusData
RFBusEna1
VCTCXOGnd
VCTCXO
RFTEMP
blitz7.3
0
2
4
5
6
7
9
0
2
5
6
7
9
0
1
2
6
BB
blitz4.0
RFCONV_O(9:0)
RFICCNTRL_O(2:0)
PUSL_O(2:0)
RFAUXCONV_O(2:0)
GENIO_O(28:0)
RFCLKGND_I
RFCLK_I
SLOWAD_O(6:0)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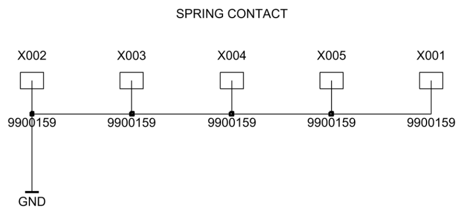
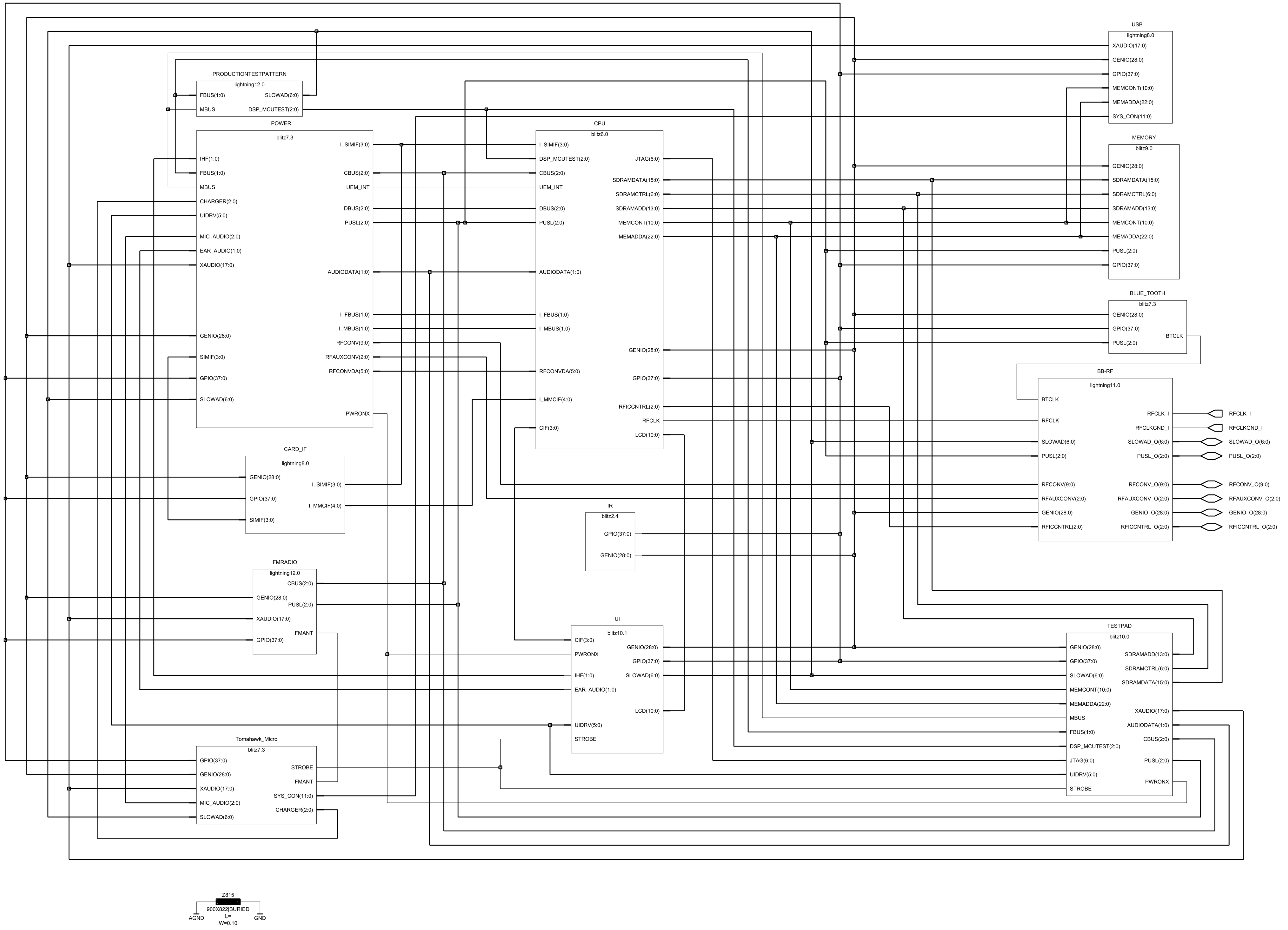

SPRING CONTACT
X002
X003
X004
X005
X001
9900159
9900159
9900159
9900159
9900159
GND

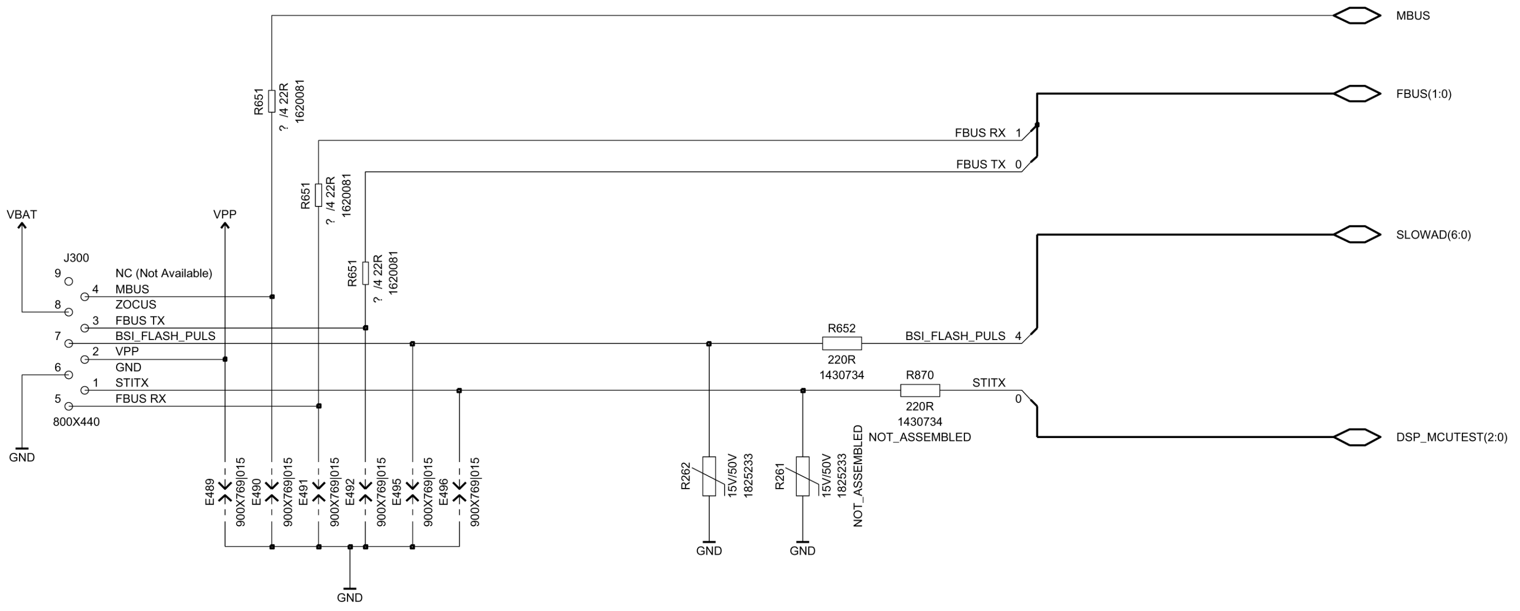
BB top level, 1kma_10

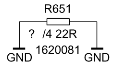
Version 4.0, Edit 162


USB
lightning8.0
XAUDIO(17:0)
GENIO(28:0)
GPIO(37:0)
MEMCONT(10:0)
MEMADDA(22:0)
SYS_CON(11:0)
MEMORY
blitz9.0
GENIO(28:0)
SDRAMDATA(15:0)
SDRAMCTRL(6:0)
SDRAMADD(13:0)
MEMCONT(10:0)
MEMADDA(22:0)
PUSL(2:0)
GPIO(37:0)
BLUE_TOOTH
blitz7.3
GENIO(28:0)
GPIO(37:0)
BTCLK
PUSL(2:0)
BB-RF
lightning11.0
BTCLK
RFCLK
RFCLK_I
RFCLKGND_I
SLOWAD(6:0)
SLOWAD_O(6:0)
PUSL(2:0)
PUSL_O(2:0)
RFCONV(9:0)
RFCONV_O(9:0)
RFAUXCONV(2:0)
RFAUXCONV_O(2:0)
GENIO(28:0)
GENIO_O(28:0)
RFICCNTRL(2:0)
RFICCNTRL_O(2:0)
RFCLK_I
RFCLKGND_I
SLOWAD_O(6:0)
PUSL_O(2:0)
RFCONV_O(9:0)
RFAUXCONV_O(2:0)
GENIO_O(28:0)
RFICCNTRL_O(2:0)
PRODUCTIONTESTPATTERN
lightning12.0
FBUS(1:0)
SLOWAD(6:0)
MBUS
DSP_MCUTEST(2:0)
POWER
blitz7.3
I_SIMIF(3:0)
IHF(1:0)
FBUS(1:0)
CBUS(2:0)
MBUS
UEM_INT
CHARGER(2:0)
DBUS(2:0)
UIDRV(5:0)
PUSL(2:0)
MIC_AUDIO(2:0)
EAR_AUDIO(1:0)
XAUDIO(17:0)
AUDIODATA(1:0)
I_FBUS(1:0)
I_MBUS(1:0)
GENIO(28:0)
RFCONV(9:0)
SIMIF(3:0)
RFAUXCONV(2:0)
RFCONVDA(5:0)
GPIO(37:0)
SLOWAD(6:0)
PWRONX
CPU
blitz6.0
I_SIMIF(3:0)
DSP_MCUTEST(2:0)
JTAG(6:0)
CBUS(2:0)
SDRAMDATA(15:0)
UEM_INT
SDRAMCTRL(6:0)
DBUS(2:0)
SDRAMADD(13:0)
PUSL(2:0)
MEMCONT(10:0)
MEMADDA(22:0)
AUDIODATA(1:0)
I_FBUS(1:0)
I_MBUS(1:0)
GENIO(28:0)
RFCONVDA(5:0)
GPIO(37:0)
I_MMCIF(4:0)
RFICCNTRL(2:0)
RFCLK
CIF(3:0)
LCD(10:0)
CARD_IF
lightning8.0
GENIO(28:0)
I_SIMIF(3:0)
GPIO(37:0)
I_MMCIF(4:0)
SIMIF(3:0)
IR
blitz2.4
GPIO(37:0)
GENIO(28:0)
FMRADIO
lightning12.0
CBUS(2:0)
GENIO(28:0)
PUSL(2:0)
XAUDIO(17:0)
FMANT
GPIO(37:0)
UI
blitz10.1
CIF(3:0)
GENIO(28:0)
PWRONX
GPIO(37:0)
IHF(1:0)
SLOWAD(6:0)
EAR_AUDIO(1:0)
LCD(10:0)
UIDRV(5:0)
STROBE
TESTPAD
blitz10.0
GENIO(28:0)
SDRAMADD(13:0)
GPIO(37:0)
SDRAMCTRL(6:0)
SLOWAD(6:0)
SDRAMDATA(15:0)
MEMCONT(10:0)
MEMADDA(22:0)
XAUDIO(17:0)
MBUS
AUDIODATA(1:0)
FBUS(1:0)
CBUS(2:0)
DSP_MCUTEST(2:0)
JTAG(6:0)
PUSL(2:0)
UIDRV(5:0)
PWRONX
STROBE
Tomahawk_Micro
blitz7.3
GPIO(37:0)
STROBE
GENIO(28:0)
FMANT
XAUDIO(17:0)
SYS_CON(11:0)
MIC_AUDIO(2:0)
CHARGER(2:0)
SLOWAD(6:0)
Z815
900X822|BURIED
L=
W=0.10
AGND
GND

■ Service test pattern 1kma_10

Version 12.0, Edit 48

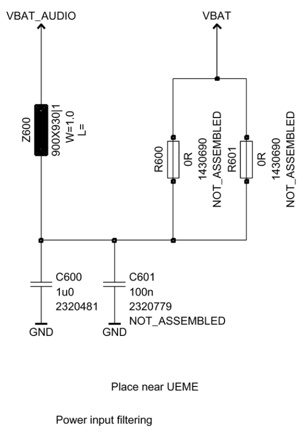

MBUS
FBUS(1:0)
FBUS RX 1
FBUS TX 0
SLOWAD(6:0)
BSI_FLASH_PULS 4
STITX
0
DSP_MCUTEST(2:0)
VBAT
VPP
J300
9
NC (Not Available)
4
MBUS
8
ZOCUS
3
FBUS TX
7
BSI_FLASH_PULS
2
VPP
6
GND
1
STITX
5
FBUS RX
800X440
GND
R651
? /4 22R
1620081
R651
? /4 22R
1620081
R651
? /4 22R
1620081
R652
220R
1430734
R870
220R
1430734
NOT_ASSEMBLED
R262
15V/50V
1825233
R261
15V/50V
1825233
NOT_ASSEMBLED
GND
GND
E489
900X769|015
E490
900X769|015
E491
900X769|015
E492
900X769|015
E495
900X769|015
E496
900X769|015
GND

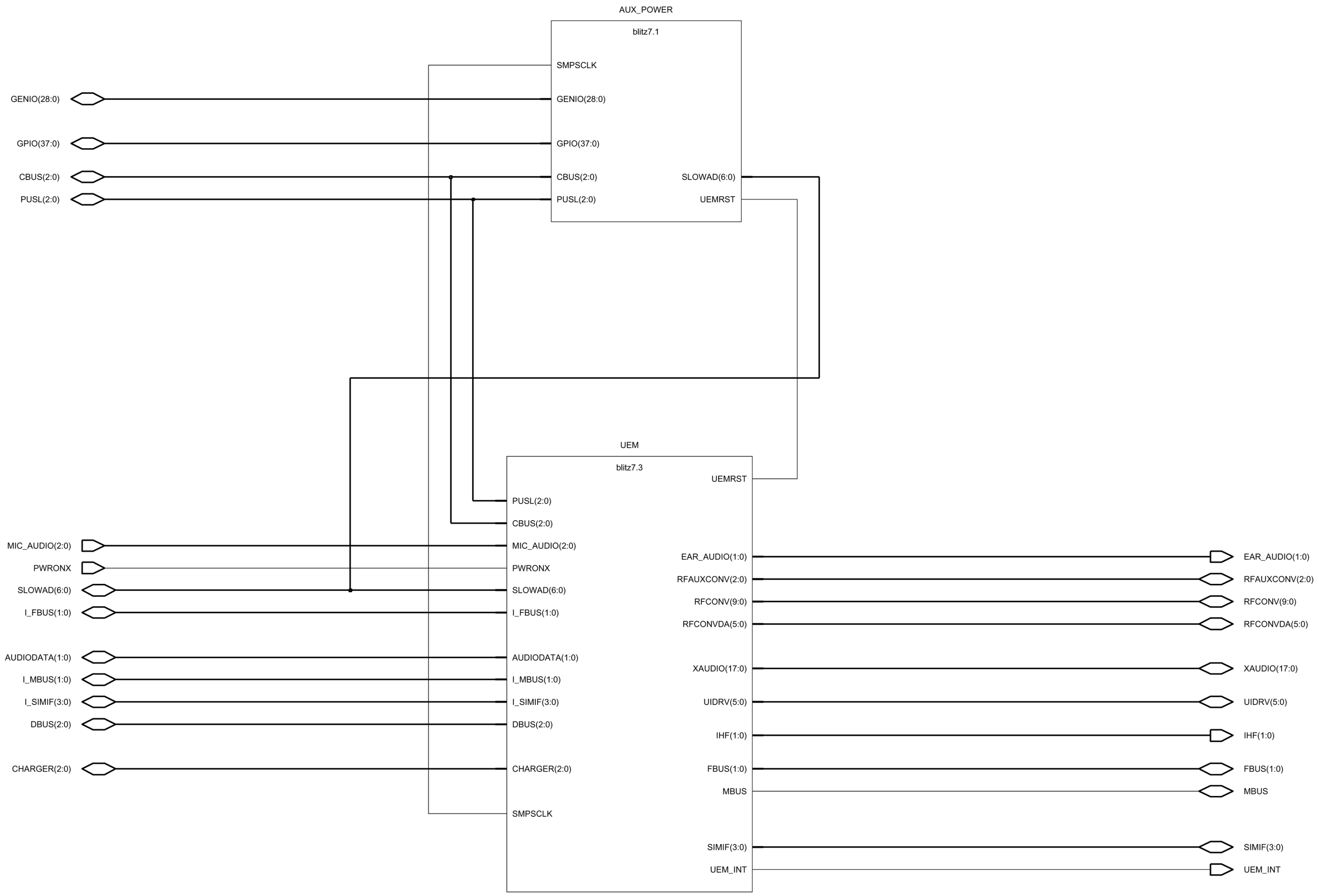

R651
? /4 22R
1620081
GND
GND

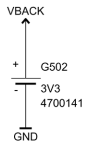
Not Used

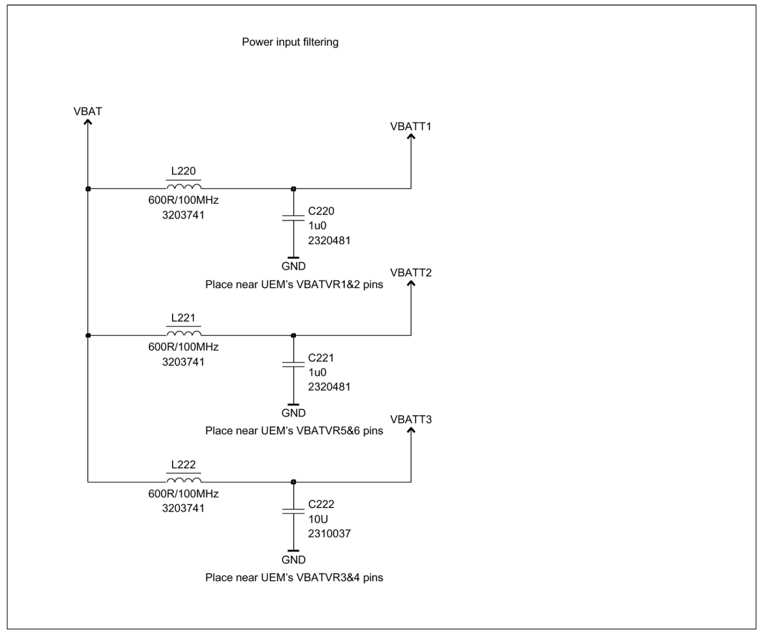
Power supply top level, 1kma_10

Version 7.3, Edit 89


VBAT_AUDIO
VBAT
Z600
900X930|1
W=1.0
L=
R600
0R
1430690
NOT_ASSEMBLED
R601
0R
1430690
NOT_ASSEMBLED
C600
1u0
2320481
GND
C601
100n
2320779
NOT_ASSEMBLED
GND
Place near UEME
Power input filtering

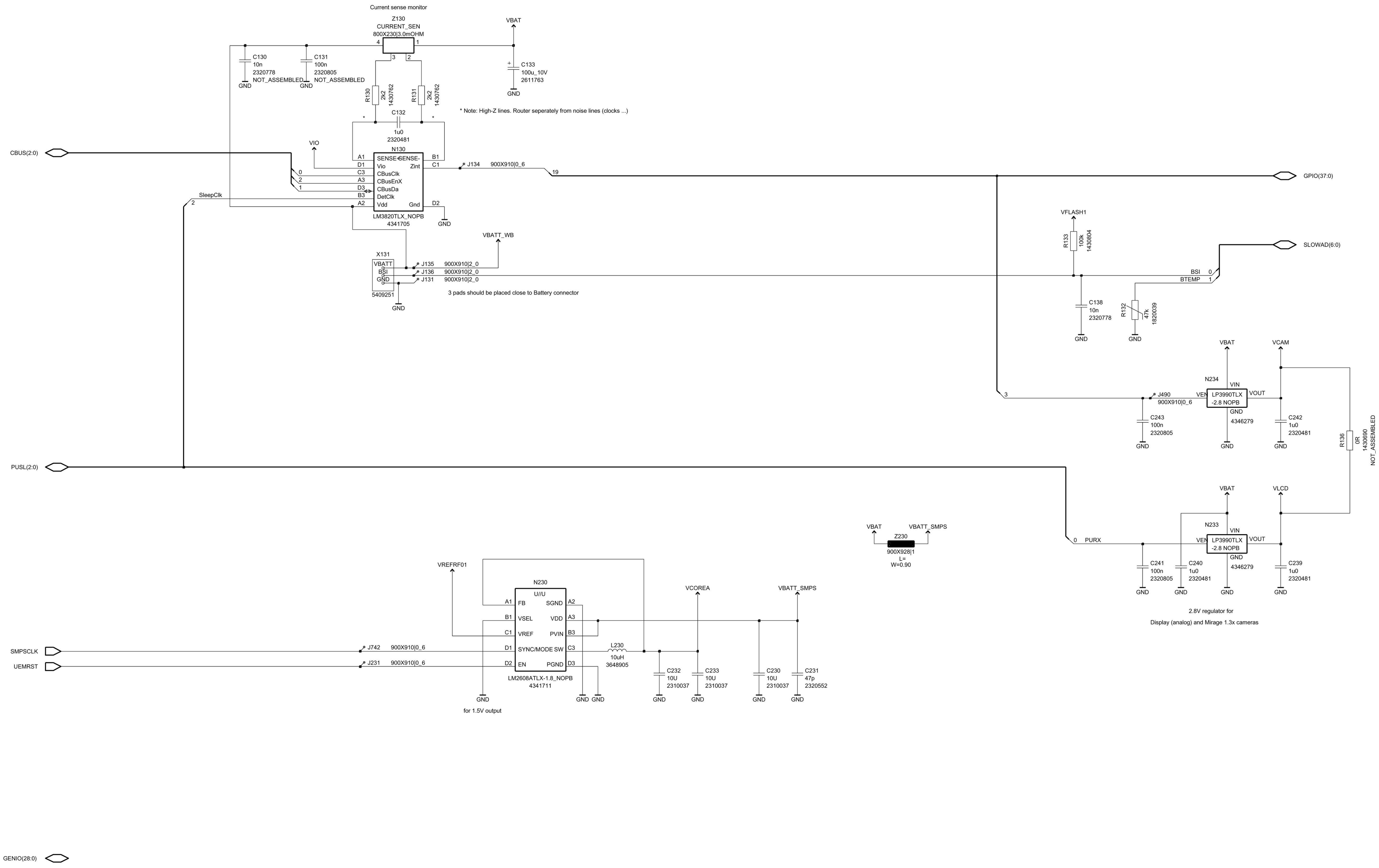

AUX_POWER
blitz7.1
SMPSCLK
GENIO(28:0)
GPIO(37:0)
CBUS(2:0)
SLOWAD(6:0)
PUSL(2:0)
UEMRST
GENIO(28:0)
GPIO(37:0)
CBUS(2:0)
PUSL(2:0)
UEM
blitz7.3
UEMRST
PUSL(2:0)
CBUS(2:0)
MIC_AUDIO(2:0)
PWRONX
SLOWAD(6:0)
I_FBUS(1:0)
AUDIODATA(1:0)
I_MBUS(1:0)
I_SIMIF(3:0)
DBUS(2:0)
CHARGER(2:0)
SMPSCLK
EAR_AUDIO(1:0)
RFAUXCONV(2:0)
RFCONV(9:0)
RFCONVDA(5:0)
XAUDIO(17:0)
UIDRV(5:0)
IHF(1:0)
FBUS(1:0)
MBUS
SIMIF(3:0)
UEM_INT
MIC_AUDIO(2:0)
PWRONX
SLOWAD(6:0)
I_FBUS(1:0)
AUDIODATA(1:0)
I_MBUS(1:0)
I_SIMIF(3:0)
DBUS(2:0)
CHARGER(2:0)
EAR_AUDIO(1:0)
RFAUXCONV(2:0)
RFCONV(9:0)
RFCONVDA(5:0)
XAUDIO(17:0)
UIDRV(5:0)
IHF(1:0)
FBUS(1:0)
MBUS
SIMIF(3:0)
UEM_INT


VBACK
+
-
G502
3V3
4700141
GND


Power input filtering
VBAT
VBATT1
L220
600R/100MHz
3203741
C220
1u0
2320481
GND
Place near UEM's VBATVR1&2 pins
VBATT2
L221
600R/100MHz
3203741
C221
1u0
2320481
GND
Place near UEM's VBATVR5&6 pins
VBATT3
L222
600R/100MHz
3203741
C222
10U
2310037
GND
Place near UEM's VBATVR3&4 pins

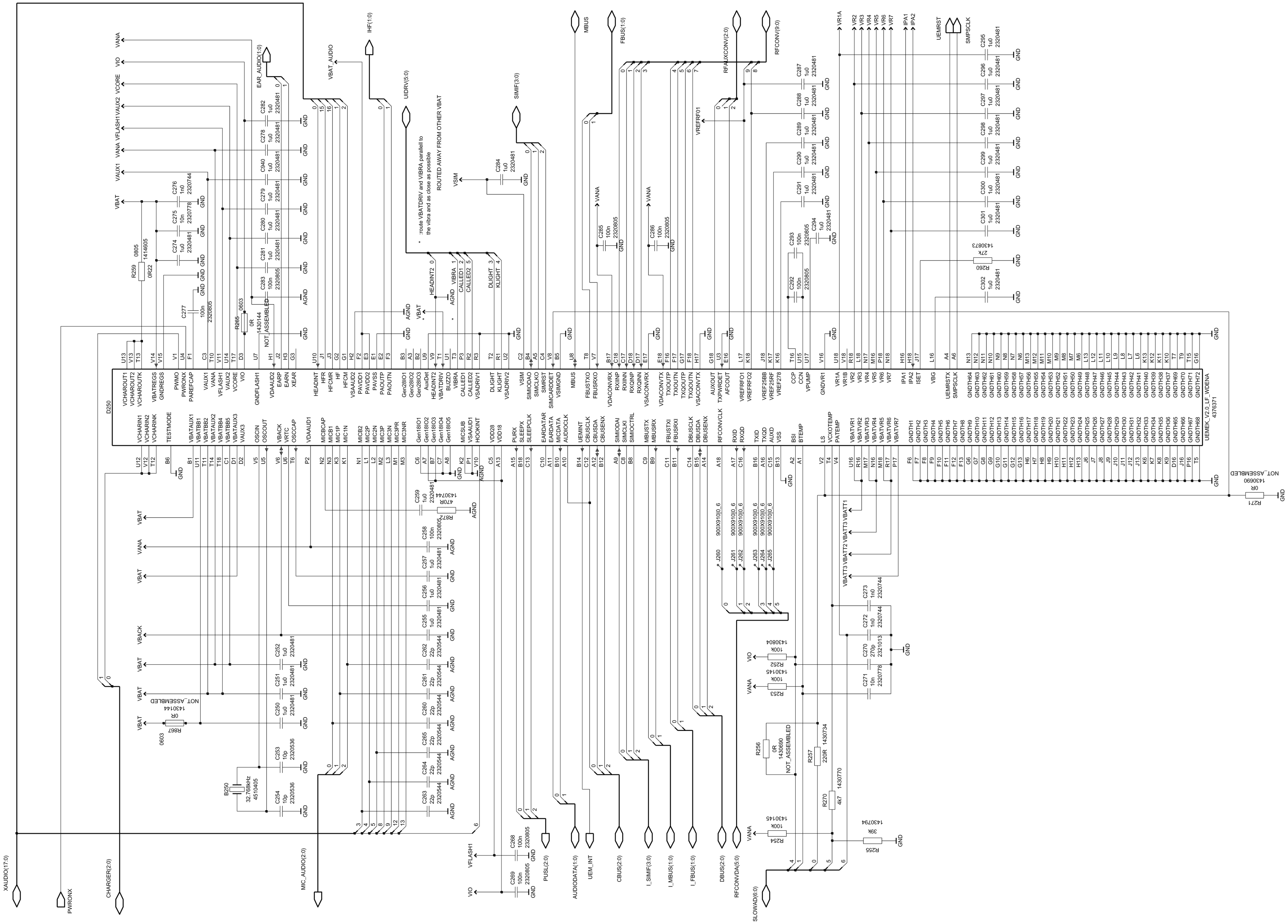
Aux power, 1kma_10

Version 7.1, Edit 125


Current sense monitor
Z130
CURRENT_SEN
800X230|3.0mOHM
VBAT
C130
10n
2320778
NOT_ASSEMBLED
C131
100n
2320805
NOT_ASSEMBLED
C133
100u_10V
2611763
GND
R130
2k2
1430762
R131
2k2
1430762
C132
1u0
2320481
* Note: High-Z lines. Router seperately from noise lines (clocks ...)
VIO
N130
SENSE+
SENSE-
Vio
Zint
CBusClk
CBusEnX
CBusDa
DetClk
Vdd
Gnd
LM3820TLX_NOPB
4341705
CBUS(2:0)
SleepClk
J134
900X910|0_6
GPIO(37:0)
VBATT_WB
X131
VBATT
BSI
GND
5409251
J135
J136
J131
900X910|2_0
3 pads should be placed close to Battery connector
VFLASH1
R133
100k
1430804
SLOWAD(6:0)
BSI
BTEMP
C138
10n
2320778
R132
47k
1820039
VCAM
N234
LP3990TLX
-2.8 NOPB
4346279
VIN
VEN
VOUT
J490
900X910|0_6
C243
100n
2320805
C242
1u0
2320481
R136
0R
1430690
NOT_ASSEMBLED
PUSL(2:0)
VLCD
N233
PURX
C241
100n
2320805
C240
1u0
2320481
C239
1u0
2320481
2.8V regulator for
Display (analog) and Mirage 1.3x cameras
VBATT_SMPS
Z230
900X928|1
L=
W=0.90
VREFRF01
N230
U//U
FB
SGND
VSEL
VDD
VREF
PVIN
SYNC/MODE
SW
EN
PGND
LM2608ATLX-1.8_NOPB
4341711
for 1.5V output
VCOREA
L230
10uH
3648905
C232
10U
2310037
C233
10U
2310037
C230
10U
2310037
C231
47p
2320552
SMPSCLK
UEMRST
J742
J231
900X910|0_6
GENIO(28:0)

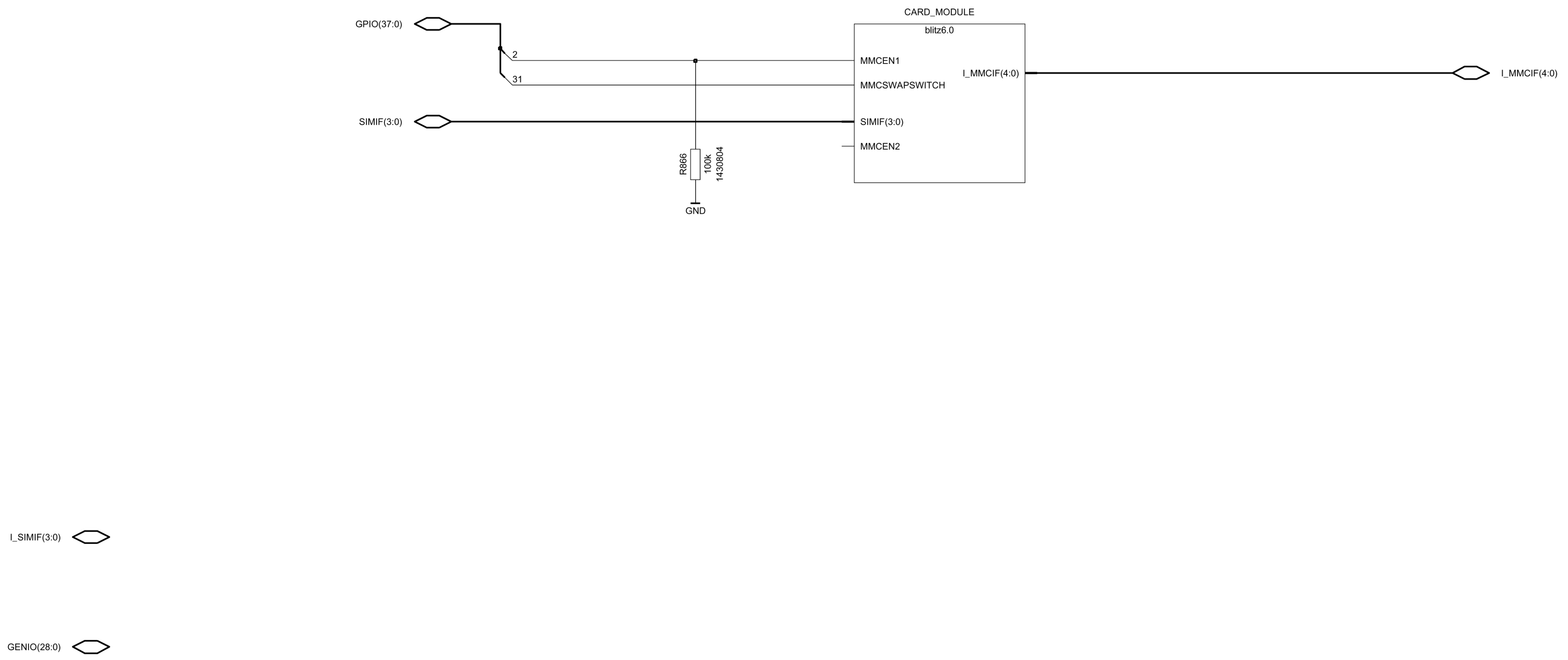
UEMEK, 1kma_10

Version 7.3, Edit 122


D250
UEMEK_V2.0_LF_WDENA
4376371
VBAT
VAUX1
VANA
VFLASH1
VAUX2
VCORE
VIO
EAR_AUDIO(1:0)
VBAT_AUDIO
IHF(1:0)
UIDRV(5:0)
SIMIF(3:0)
MBUS
FBUS(1:0)
RFAUXCONV(2:0)
RFCONV(9:0)
VR1A
VR2
VR3
VR4
VR5
VR6
VR7
IPA1
IPA2
UEMRST
SMPSCLK
route VBATDRV and VBRA parallel to the vibra and as close as possible
ROUTED AWAY FROM OTHER VBAT
VSIM
VREFRF01
HEADINT2
VIBRA
CALLED1
CALLED2
DLIGHT
KLIGHT
AGND
GND
NOT_ASSEMBLED
B250
32.768kHz
4510405
VBACK
VBATT1
VBATT2
VBATT3
J260
J261
J262
J263
J264
J265
900X9100_6
R252
100k
1430145
R253
R254
R255
39k
1430794
R256
0R
1430690
R257
220R
1430734
R270
4k7
1430770
R260
27k
1430873
R271
R267
R265
R259
R872
470R
1430744
XAUDIO(17:0)
PWRONX
CHARGER(2:0)
MIC_AUDIO(2:0)
VFLASH1
PUSL(2:0)
AUDIODATA(1:0)
UEM_INT
CBUS(2:0)
I_SIMIF(3:0)
I_MBUS(1:0)
I_FBUS(1:0)
DBUS(2:0)
RFCONVDA(5:0)
SLOWAD(6:0)
VIO
VANA

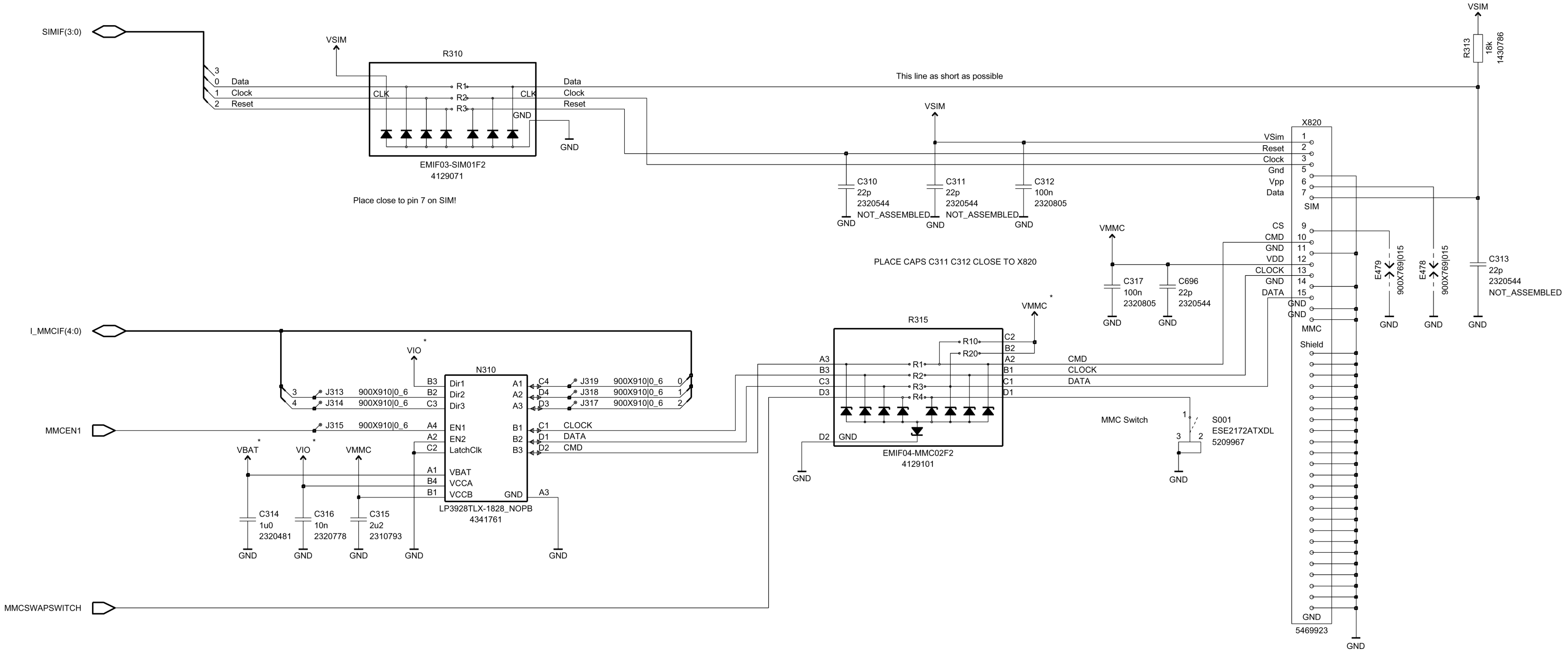
Card interface, 1kma_10

Version 8.0, Edit 83


GPIO(37:0)
2
31
SIMIF(3:0)
CARD_MODULE
blitz6.0
MMCEN1
MMCSWAPSWITCH
SIMIF(3:0)
MMCEN2
I_MMCIF(4:0)
I_MMCIF(4:0)
R866
100k
1430804
GND
I_SIMIF(3:0)
GENIO(28:0)

Card interface module, 1kma_10

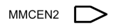
Version 6.0, Edit 104


SIMIF(3:0)
VSIM
R310
3
0 Data
1 Clock
2 Reset
CLK
R1
R2
R3
CLK
Data
Clock
Reset
GND
GND
EMIF03-SIM01F2
4129071
Place close to pin 7 on SIM!
This line as short as possible
VSIM
R313
18k
1430786
VSIM
X820
VSim 1
Reset 2
Clock 3
Gnd 5
Vpp 6
Data 7
SIM
C310
22p
2320544
NOT_ASSEMBLED
C311
22p
2320544
NOT_ASSEMBLED
C312
100n
2320805
GND
PLACE CAPS C311 C312 CLOSE TO X820
VMMC
CS 9
CMD 10
GND 11
VDD 12
CLOCK 13
GND 14
DATA 15
GND
GND
MMC
Shield
C317
100n
2320805
C696
22p
2320544
E479
900X769|015
E478
900X769|015
C313
22p
2320544
NOT_ASSEMBLED
I_MMCIF(4:0)
VIO
N310
B3 Dir1 A1 C4
B2 Dir2 A2 D4
C3 Dir3 A3 D3
A4 EN1 B1 C1
A2 EN2 B2 D1
C2 LatchClk B3 D2
A1 VBAT
B4 VCCA
B1 VCCB GND A3
LP3928TLX-1828_NOPB
4341761
J313 900X910|0_6
J314 900X910|0_6
J315 900X910|0_6
J319 900X910|0_6
J318 900X910|0_6
J317 900X910|0_6
CLOCK
DATA
CMD
MMCEN1
VBAT
VIO
VMMC
C314
1u0
2320481
C316
10n
2320778
C315
2u2
2310793
R315
VMMC
A3 R1 R10 C2
B3 R2 R20 B2
C3 R3 A2
D3 R4 B1
C1
D1
D2 GND
CMD
CLOCK
DATA
EMIF04-MMC02F2
4129101
MMC Switch
S001
ESE2172ATXDL
5209967
GND
5469923
MMCSWAPSWITCH

NOTE: The MMC specification imposes the following impedance limits

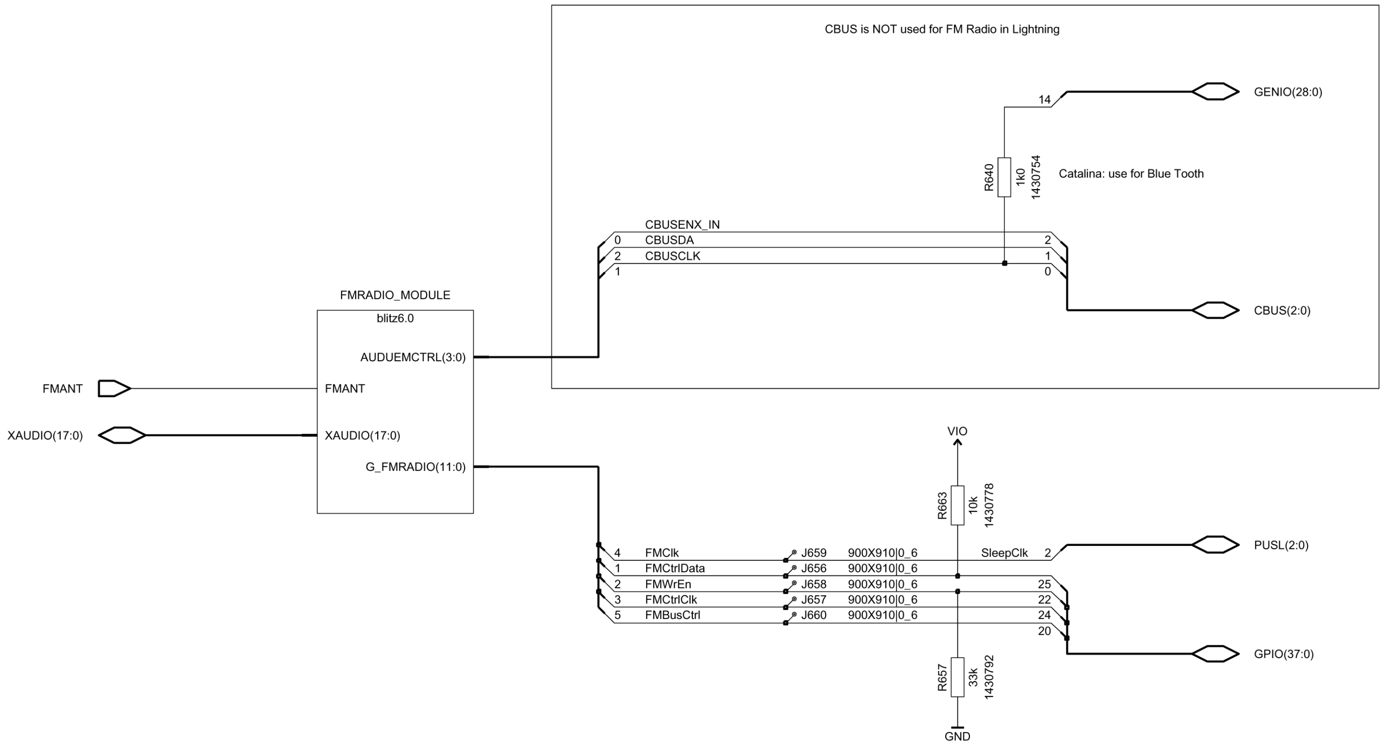
Command pullup resistance 4.7k to 100k
Data pullup resistance 50k to 100k

EMIF02-MMC R10=13k (therefore only suitable for command line) ???
EMIF02-MMC R20=56k (therefore only suitable for data line) ???
EMIF02-MMC R1/R2/R3/R4=47R ???



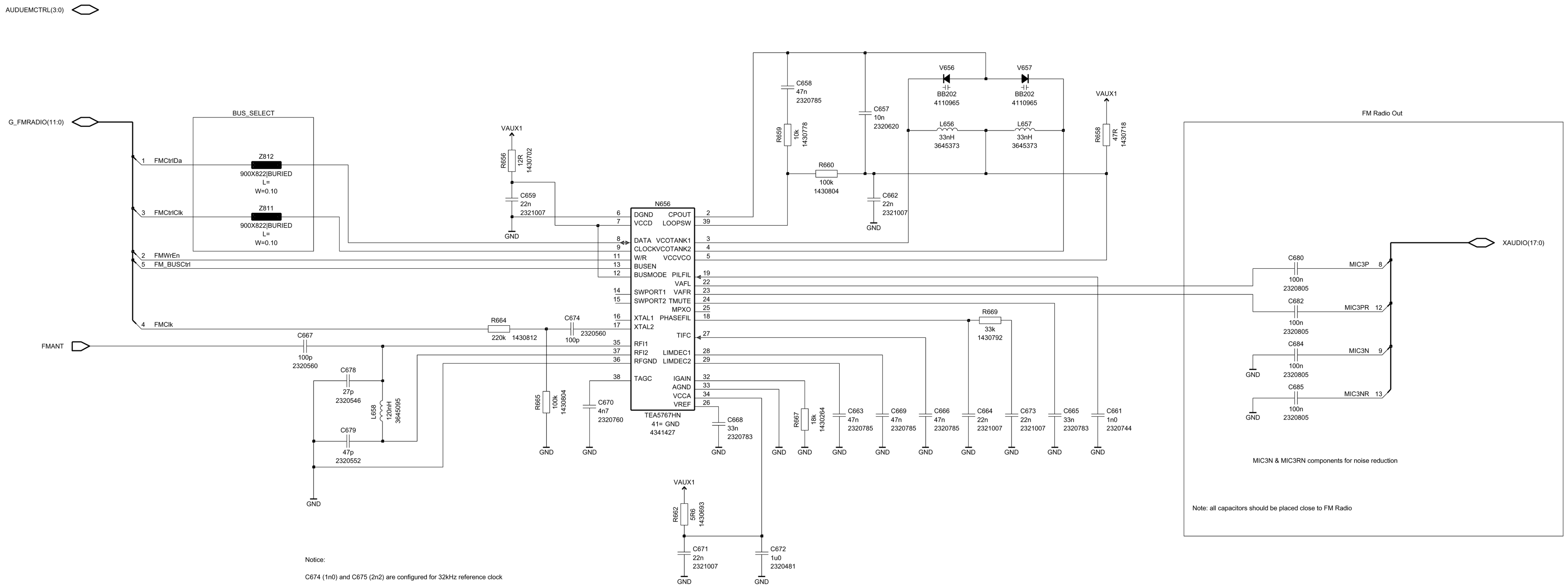
FM radio top level, 1kma_10

Version 12.0, Edit 27


CBUS is NOT used for FM Radio in Lightning
14
GENIO(28:0)
R640
1k0
1430754
Catalina: use for Blue Tooth
CBUSENX_IN
0
CBUSDA
2
CBUSCLK
1
2
1
0
CBUS(2:0)
FMRADIO_MODULE
blitz6.0
AUDUEMCTRL(3:0)
FMANT
FMANT
XAUDIO(17:0)
XAUDIO(17:0)
G_FMRADIO(11:0)
VIO
R663
10k
1430778
4
FMClk
J659
900X910|0_6
SleepClk
2
PUSL(2:0)
1
FMCtrlData
J656
900X910|0_6
2
FMWrEn
J658
900X910|0_6
25
3
FMCtrlClk
J657
900X910|0_6
22
5
FMBusCtrl
J660
900X910|0_6
24
20
GPIO(37:0)
R657
33k
1430792
GND

FM radio module, 1kma_10

Version 6.0, Edit 45


AUDUEMCTRL(3:0)
G_FMRADIO(11:0)
BUS_SELECT
1 FMCtrlDa
3 FMCtrlClk
2 FMWrEn
5 FM_BUSCtrl
4 FMClk
Z812
900X822|BURIED
L=
W=0.10
Z811
900X822|BURIED
L=
W=0.10
FMANT
C667
100p
2320560
C678
27p
2320546
L658
120nH
3645095
C679
47p
2320552
GND
VAUX1
R656
12R
1430702
C659
22n
2321007
R664
220k 1430812
C674
100p
2320560
R665
100k
1430804
C670
4n7
2320760
N656
DGND
VCCD
DATA
CLOCK
W/R
BUSEN
BUSMODE
SWPORT1
SWPORT2
XTAL1
XTAL2
RFI1
RFI2
RFGND
TAGC
CPOUT
LOOPSW
VCOTANK1
VCOTANK2
VCCVCO
PILFIL
VAFL
VAFR
TMUTE
MPXO
PHASEFIL
TIFC
LIMDEC1
LIMDEC2
IGAIN
AGND
VCCA
VREF
TEA5767HN
41= GND
4341427
C658
47n
2320785
R659
10k
1430778
C657
10n
2320620
R660
100k
1430804
C662
22n
2321007
V656
BB202
4110965
V657
BB202
4110965
L656
33nH
3645373
L657
33nH
3645373
R658
47R
1430718
C668
33n
2320783
R667
18k
1430264
R669
33k
1430792
C663
47n
2320785
C669
47n
2320785
C666
47n
2320785
C664
22n
2321007
C673
22n
2321007
C665
33n
2320783
C661
1n0
2320744
R662
5R6
1430693
C671
22n
2321007
C672
1u0
2320481
FM Radio Out
XAUDIO(17:0)
C680
100n
2320805
MIC3P 8
C682
100n
2320805
MIC3PR 12
C684
100n
2320805
MIC3N 9
C685
100n
2320805
MIC3NR 13

MIC3N & MIC3RN components for noise reduction

Note: all capacitors should be placed close to FM Radio

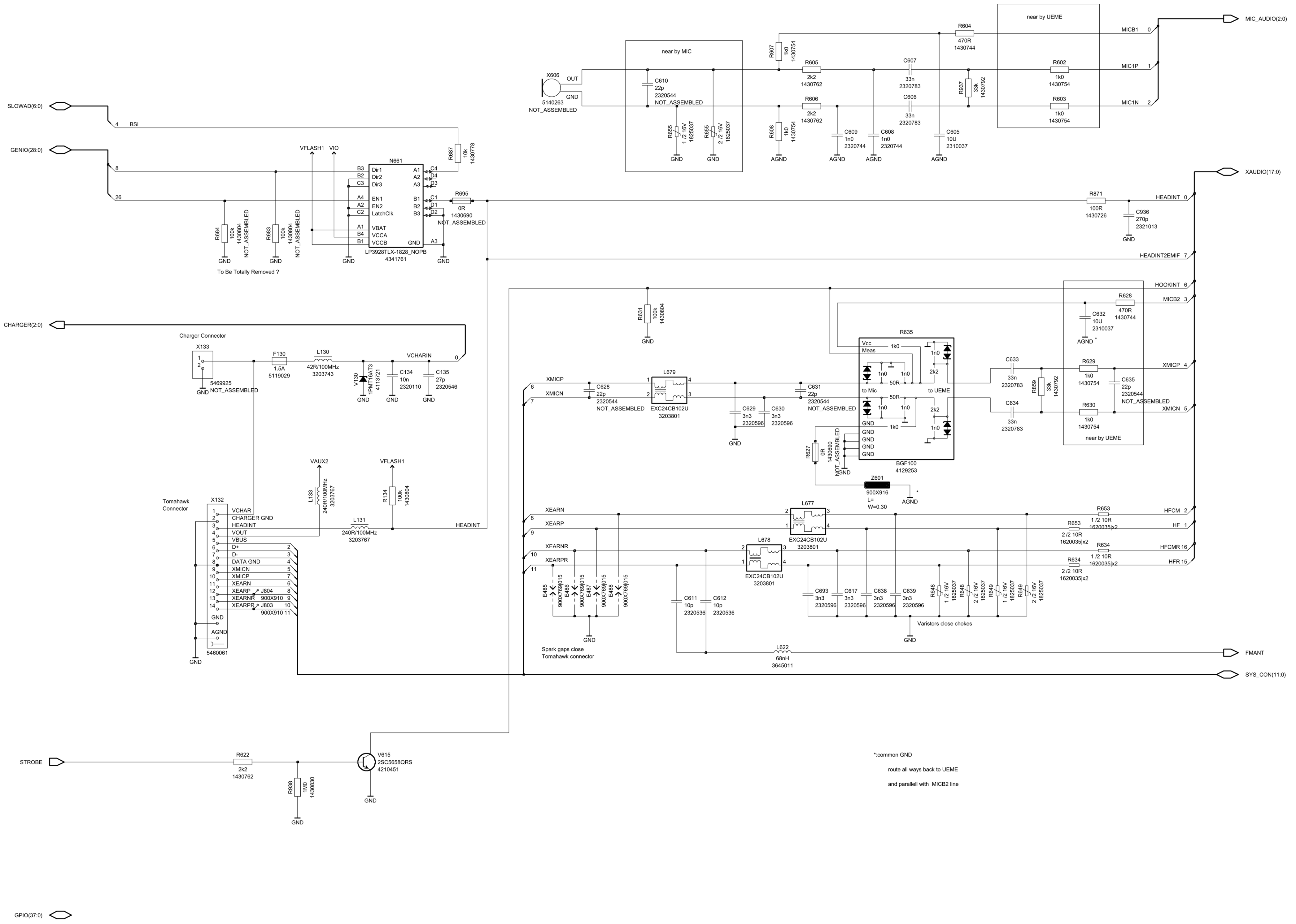
Notice:

C674 (1n0) and C675 (2n2) are configured for 32kHz reference clock

If reference clock is 6.5MHz, use C674 (3p9) and C675 (10p)

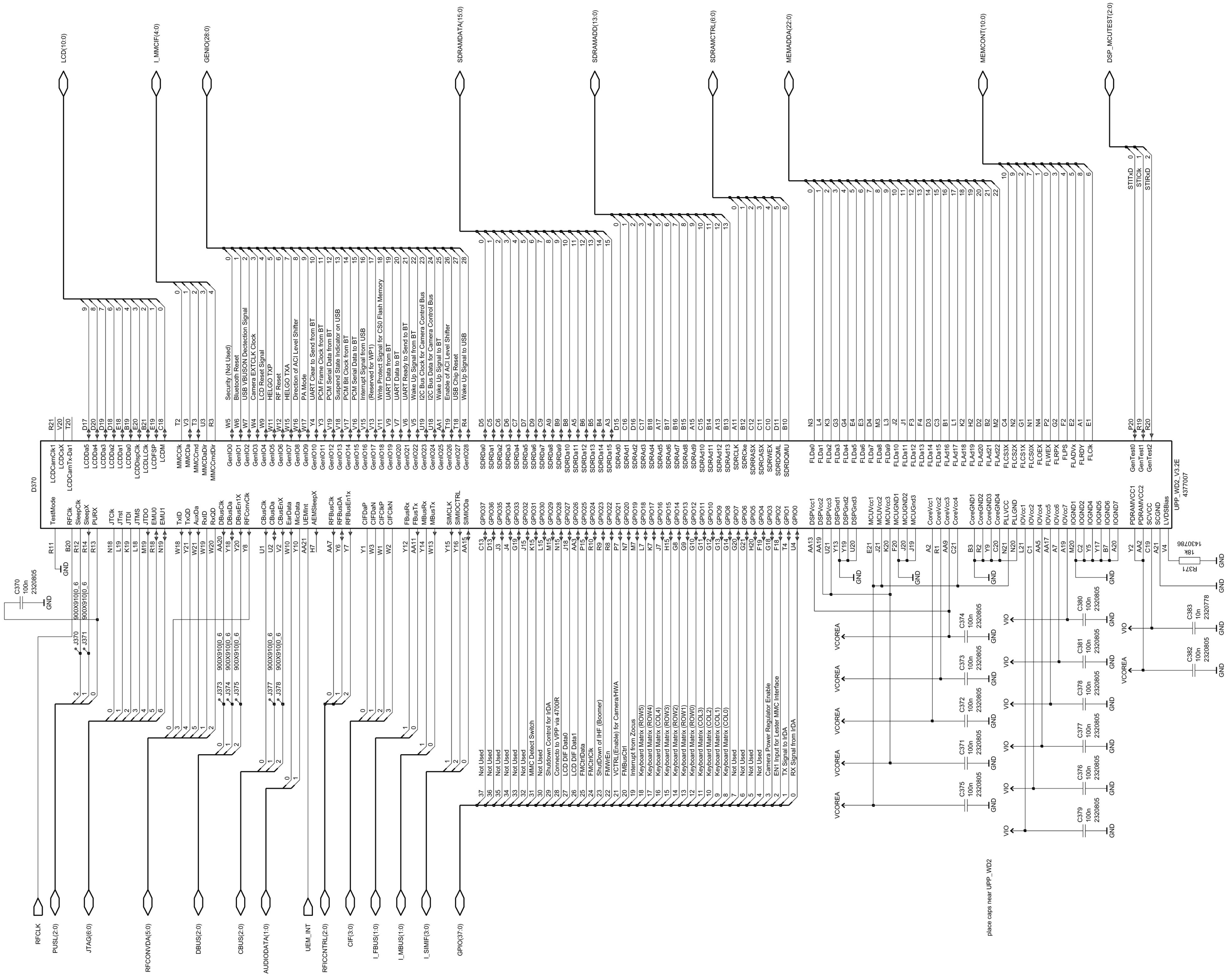
PopPort™ bottom connector and microphone, 1kma_10

Version 7.3, Edit 138


MIC_AUDIO(2:0)
near by UEME
MICB1 0
MIC1P 1
MIC1N 2
R604 470R 1430744
R602 1k0 1430754
R603 1k0 1430754
R607 1k0 1430754
R605 2k2 1430762
R606 2k2 1430762
C607 33n 2320783
C606 33n 2320783
R937 33k 1430792
near by MIC
X606 OUT GND 5140263 NOT_ASSEMBLED
C610 22p 2320544 NOT_ASSEMBLED
R655 1 /2 16V 1825037
R655 2 /2 16V 1825037
R608 1k0 1430754
C609 1n0 2320744
C608 1n0 2320744
C605 10U 2310037
AGND
GND
SLOWAD(6:0)
4 BSI
GENIO(28:0)
8
26
VFLASH1 VIO
N661
B3 Dir1 A1 C4
B2 Dir2 A2 D4
C3 Dir3 A3 D3
A4 EN1 B1 C1
A2 EN2 B2 D1
C2 LatchClk B3 D2
A1 VBAT
B4 VCCA
B1 VCCB GND A3
LP3928TLX-1828_NOPB 4341761
R687 10k 1430778
R695 0R 1430690 NOT_ASSEMBLED
R684 100k 1430804 NOT_ASSEMBLED
R683 100k 1430804 NOT_ASSEMBLED
To Be Totally Removed ?
XAUDIO(17:0)
R871 100R 1430726
C936 270p 2321013
HEADINT 0
HEADINT2EMIF 7
HOOKINT 6
MICB2 3
CHARGER(2:0)
Charger Connector
X133 1 2 5469925 NOT_ASSEMBLED
F130 1.5A 5119029
L130 42R/100MHz 3203743
VCHARIN 0
V130 1PMT16AT3 4113721
C134 10n 2320110
C135 27p 2320546
R631 100k 1430804
R628 470R 1430744
C632 10U 2310037
R635
Vcc Meas 1k0 1n0 2k2 50R to Mic to UEME GND
BGF100 4129253
R627 0R 1430690 NOT_ASSEMBLED
Z601 900X916 L= W=0.30
XMICP
XMICN
6
7
C628 22p 2320544 NOT_ASSEMBLED
L679 EXC24CB102U 3203801
C629 3n3 2320596
C630 3n3 2320596
C631 22p 2320544 NOT_ASSEMBLED
C633 33n 2320783
C634 33n 2320783
R659 33k 1430792
R629 1k0 1430754
R630 1k0 1430754
C635 22p 2320544 NOT_ASSEMBLED
near by UEME
XMICP 4
XMICN 5
VAUX2
VFLASH1
L133 240R/100MHz 3203767
R134 100k 1430804
Tomahawk Connector
X132
VCHAR
CHARGER GND
HEADINT
VOUT
VBUS
D+
D-
DATA GND
XMICN
XMICP
XEARN
XEARP J804
XEARNR 900X910
XEARPR J803
900X910
GND
AGND
5460061
L131 240R/100MHz 3203767
HEADINT
XEARN
XEARP
XEARNR
XEARPR
8
9
10
11
L677 EXC24CB102U 3203801
L678 EXC24CB102U 3203801
R653 1 /2 10R 1620035
R653 2 /2 10R 1620035
R634 1 /2 10R 1620035
R634 2 /2 10R 1620035
HFCM 2
HF 1
HFCMR 16
HFR 15
E485 900X769015
E486 900X769015
E487 900X769015
E488 900X769015
C611 10p 2320536
C612 10p 2320536
C693 3n3 2320596
C617 3n3 2320596
C638 3n3 2320596
C639 3n3 2320596
R648 1 /2 16V 1825037
R648 2 /2 16V 1825037
R649 1 /2 16V 1825037
R649 2 /2 16V 1825037
Varistors close chokes
Spark gaps close Tomahawk connector
L622 68nH 3645011
FMANT
SYS_CON(11:0)
STROBE
R622 2k2 1430762
R938 1M0 1430830
V615 2SC5658QRS 4210451
*:common GND
route all ways back to UEME
and parallel with MICB2 line
GPIO(37:0)

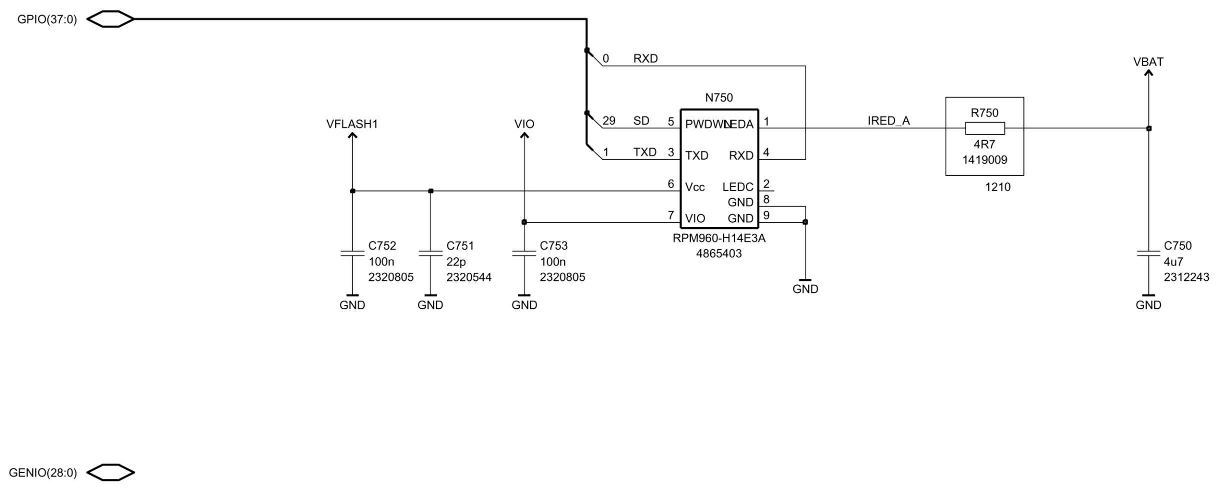
UPP_WD2, 1kma_10

Version 6.0, Edit 70


LCD(10:0)
I_MMCIF(4:0)
GENIO(28:0)
SDRAMDATA(15:0)
SDRAMADD(13:0)
SDRAMCTRL(6:0)
MEMADDA(22:0)
MEMCONT(10:0)
DSP_MCUTEST(2:0)
D370
UPP_WD2_V3.2E
4377007
RFCLK
PUSL(2:0)
JTAG(6:0)
RFCONVDA(5:0)
DBUS(2:0)
CBUS(2:0)
AUDIODATA(1:0)
UEM_INT
RFICCNTRL(2:0)
CIF(3:0)
I_FBUS(1:0)
I_MBUS(1:0)
I_SIMIF(3:0)
GPIO(37:0)
VCOREA
VIO
GND
C370
100n
2320805
R371
18k
1430785
C383
10n
2320778
place caps near UPP_WD2

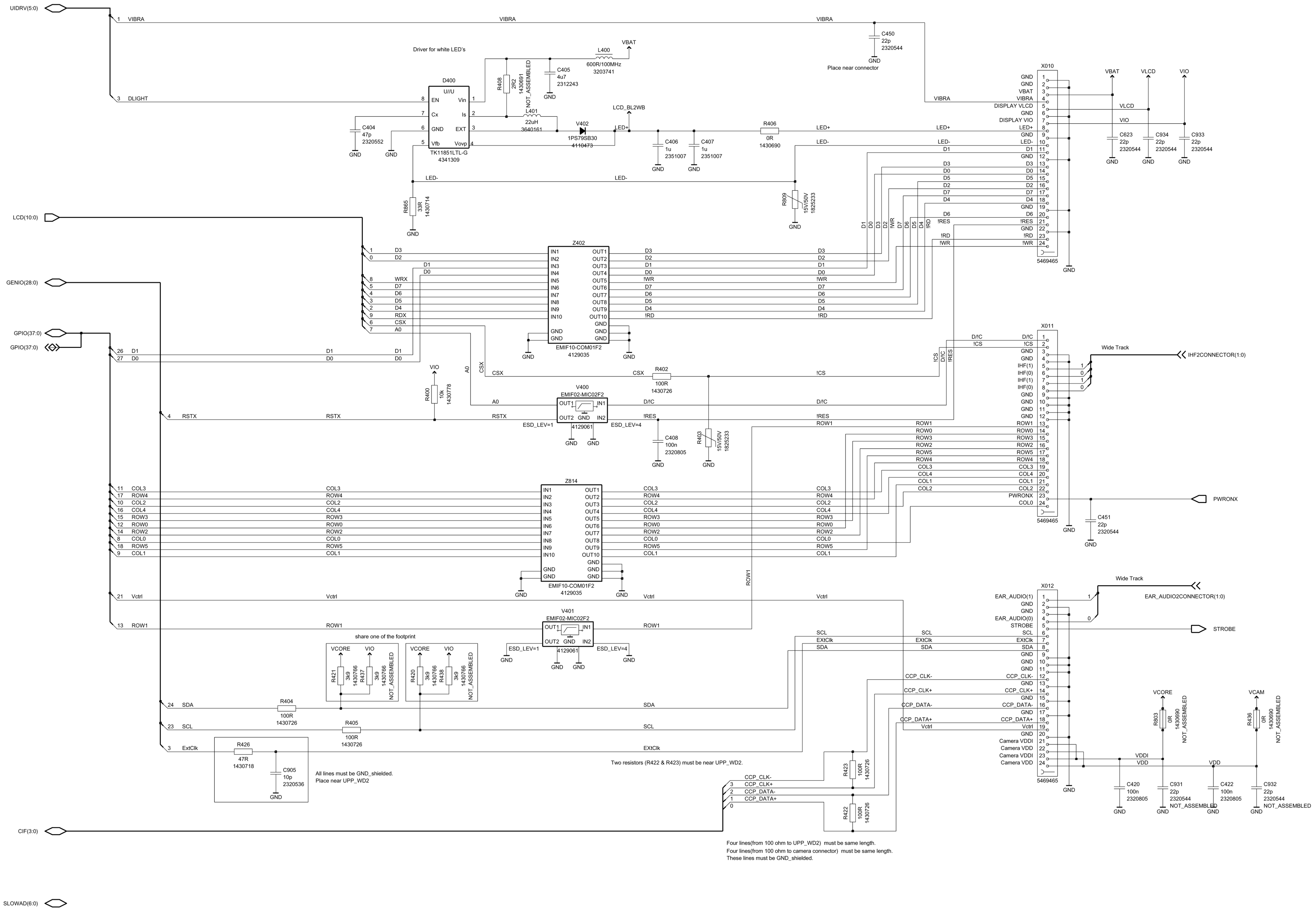
■ IR module, 1kma_10

Version 2.4, Edit 102


GPIO(37:0)
0
RXD
29
SD
1
TXD
N750
5
PWDWN
3
TXD
6
Vcc
7
VIO
LEDA
1
RXD
4
LEDC
2
GND
8
GND
9
RPM960-H14E3A
4865403
GND
VFLASH1
VIO
C752
100n
2320805
GND
C751
22p
2320544
GND
C753
100n
2320805
GND
IRED_A
R750
4R7
1419009
1210
VBAT
C750
4u7
2312243
GND
GENIO(28:0)

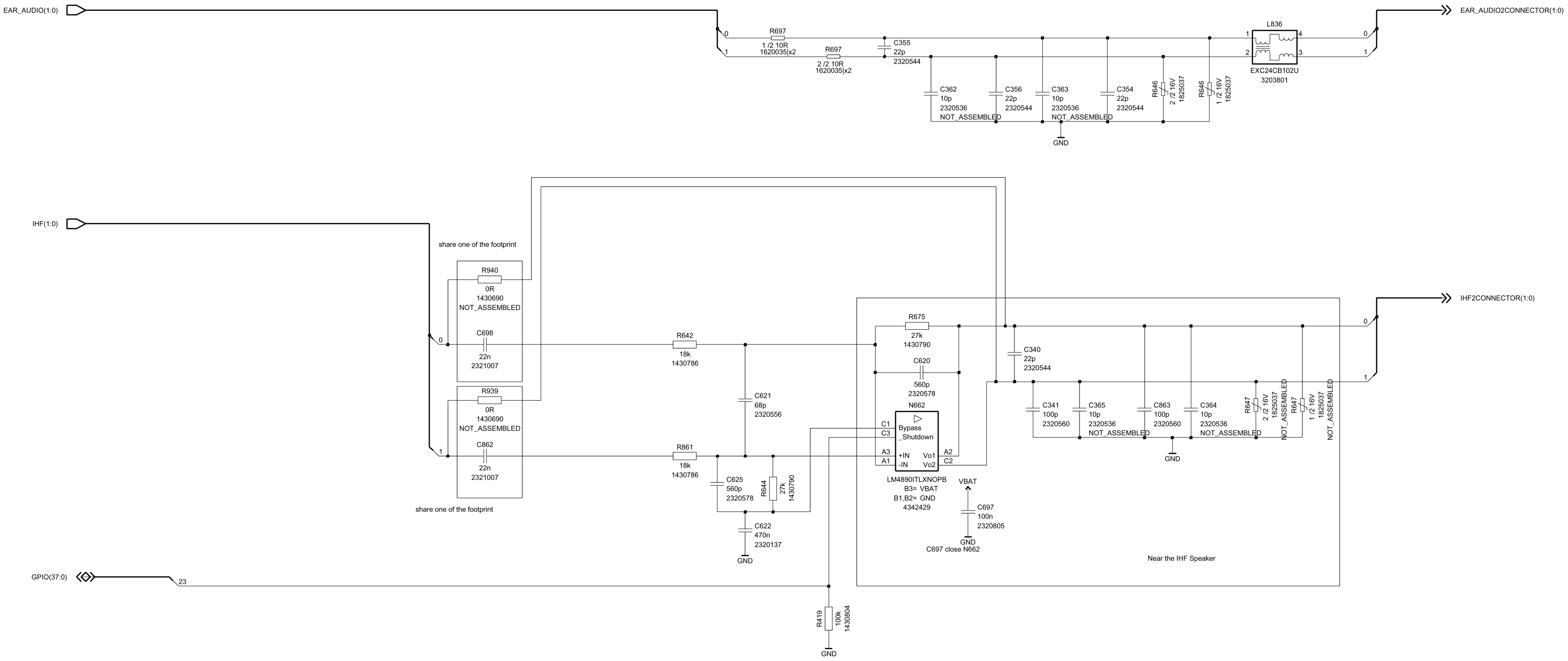
■ UI (top part and keyboard) for flex, 1kma_10

Version 8.0, Edit 53


UIDRV(5:0)
VIBRA
DLIGHT
Driver for white LED's
D400
UI/U
TK11851LTL-G
4341309
L400
600R/100MHz
3203741
VBAT
C405
4u7
2312243
R408
2R2
1430691
NOT_ASSEMBLED
L401
22uH
3640161
V402
1PS79SB30
4110473
LCD_BL2WB
LED+
LED-
C404
47p
2320552
C406
1u
2351007
C407
1u
2351007
R406
0R
1430690
R865
33R
1430714
R809
15V/50V
1825233
C450
22p
2320544
Place near connector
X010
5469465
GND
VBAT
VIBRA
DISPLAY VLCD
DISPLAY VIO
!RES
!RD
!WR
VLCD
VIO
C623
22p
2320544
C934
22p
2320544
C933
22p
2320544
LCD(10:0)
Z402
EMIF10-COM01F2
4129035
GENIO(28:0)
GPIO(37:0)
WRX
RDX
CSX
A0
VIO
R400
10k
1430778
V400
EMIF02-MIC02F2
4129061
ESD_LEV=1
ESD_LEV=4
R402
100R
1430726
C408
100n
2320805
R403
15V/50V
1825233
RSTX
X011
5469465
D/C
!CS
IHF(1)
IHF(0)
Wide Track
IHF2CONNECTOR(1:0)
ROW0
ROW1
ROW2
ROW3
ROW4
ROW5
COL0
COL1
COL2
COL3
COL4
PWRONX
PWRONX
C451
22p
2320544
Z814
EMIF10-COM01F2
4129035
Vctrl
V401
EMIF02-MIC02F2
4129061
share one of the footprint
VCORE
R421
3k9
1430766
R437
3k9
1430766
NOT_ASSEMBLED
R420
3k9
1430766
R438
3k9
1430766
NOT_ASSEMBLED
R404
100R
1430726
R405
100R
1430726
SDA
SCL
ExtClk
R426
47R
1430718
C905
10p
2320536
All lines must be GND_shielded.
Place near UPP_WD2
X012
5469465
EAR_AUDIO(1)
EAR_AUDIO(0)
STROBE
EAR_AUDIO2CONNECTOR(1:0)
STROBE
CCP_CLK-
CCP_CLK+
CCP_DATA-
CCP_DATA+
Camera VDDI
Camera VDD
VCAM
R803
0R
1430690
NOT_ASSEMBLED
R436
0R
1430690
NOT_ASSEMBLED
VDDI
VDD
C420
100n
2320805
C931
22p
2320544
NOT_ASSEMBLED
C422
100n
2320805
C932
22p
2320544
NOT_ASSEMBLED
Two resistors (R422 & R423) must be near UPP_WD2.
R423
100R
1430726
R422
100R
1430726
CIF(3:0)
Four lines(from 100 ohm to UPP_WD2) must be same length.
Four lines(from 100 ohm to camera connector) must be same length.
These lines must be GND_shielded.
SLOWAD(6:0)

■ UI (audio), 1kma_10

Version 10.1, Edit 112

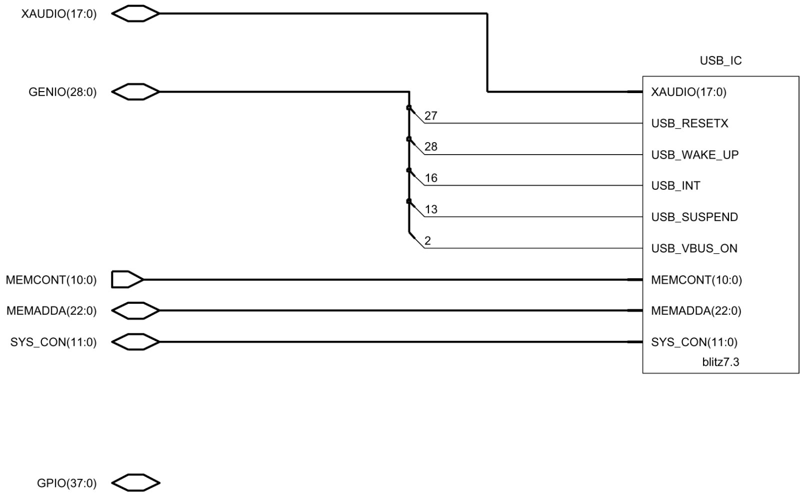

EAR_AUDIO(1:0)
0
1
R697
1 /2 10R
1620035|x2
R697
2 /2 10R
1620035|x2
C355
22p
2320544
C362
10p
2320536
NOT_ASSEMBLED
C356
22p
2320544
C363
10p
2320536
NOT_ASSEMBLED
C354
22p
2320544
R646
2 /2 16V
1825037
R646
1 /2 16V
1825037
GND
L836
1
2
4
3
EXC24CB102U
3203801
EAR_AUDIO2CONNECTOR(1:0)
IHF(1:0)
share one of the footprint
R940
0R
1430690
NOT_ASSEMBLED
C698
22n
2321007
R939
0R
1430690
NOT_ASSEMBLED
C862
22n
2321007
share one of the footprint
R642
18k
1430786
R861
18k
1430786
C621
68p
2320556
C625
560p
2320578
R644
27k
1430790
C622
470n
2320137
GND
R675
27k
1430790
C620
560p
2320578
N662
C1
C3
Bypass
_Shutdown
A3
A1
+IN
-IN
Vo1
Vo2
A2
C2
LM4890ITLXNOPB
B3= VBAT
B1,B2= GND
4342429
VBAT
C697
100n
2320805
GND
C697 close N662
C340
22p
2320544
C341
100p
2320560
C365
10p
2320536
NOT_ASSEMBLED
C863
100p
2320560
C364
10p
2320536
NOT_ASSEMBLED
GND
R647
2 /2 16V
1825037
NOT_ASSEMBLED
R647
1 /2 16V
1825037
NOT_ASSEMBLED
Near the IHF Speaker
IHF2CONNECTOR(1:0)
0
1
GPIO(37:0)
23
R419
100k
1430804
GND

Schematic hasn't been discussed or reviewed

Should Boomer be removed on next build?

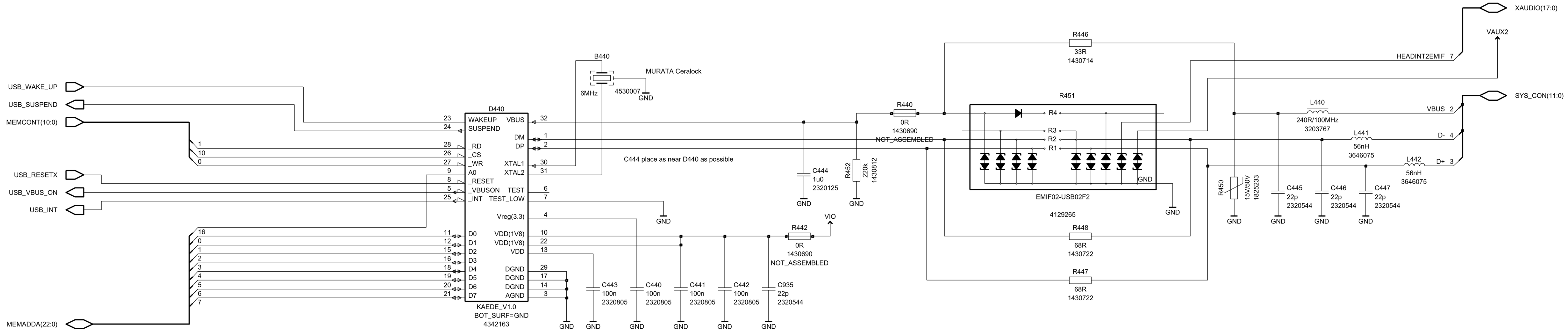
USB, 1kma_10

Version 8.0, Edit 53


XAUDIO(17:0)
GENIO(28:0)
MEMCONT(10:0)
MEMADDA(22:0)
SYS_CON(11:0)
GPIO(37:0)
27
28
16
13
2
USB_IC
XAUDIO(17:0)
USB_RESETX
USB_WAKE_UP
USB_INT
USB_SUSPEND
USB_VBUS_ON
MEMCONT(10:0)
MEMADDA(22:0)
SYS_CON(11:0)
blitz7.3

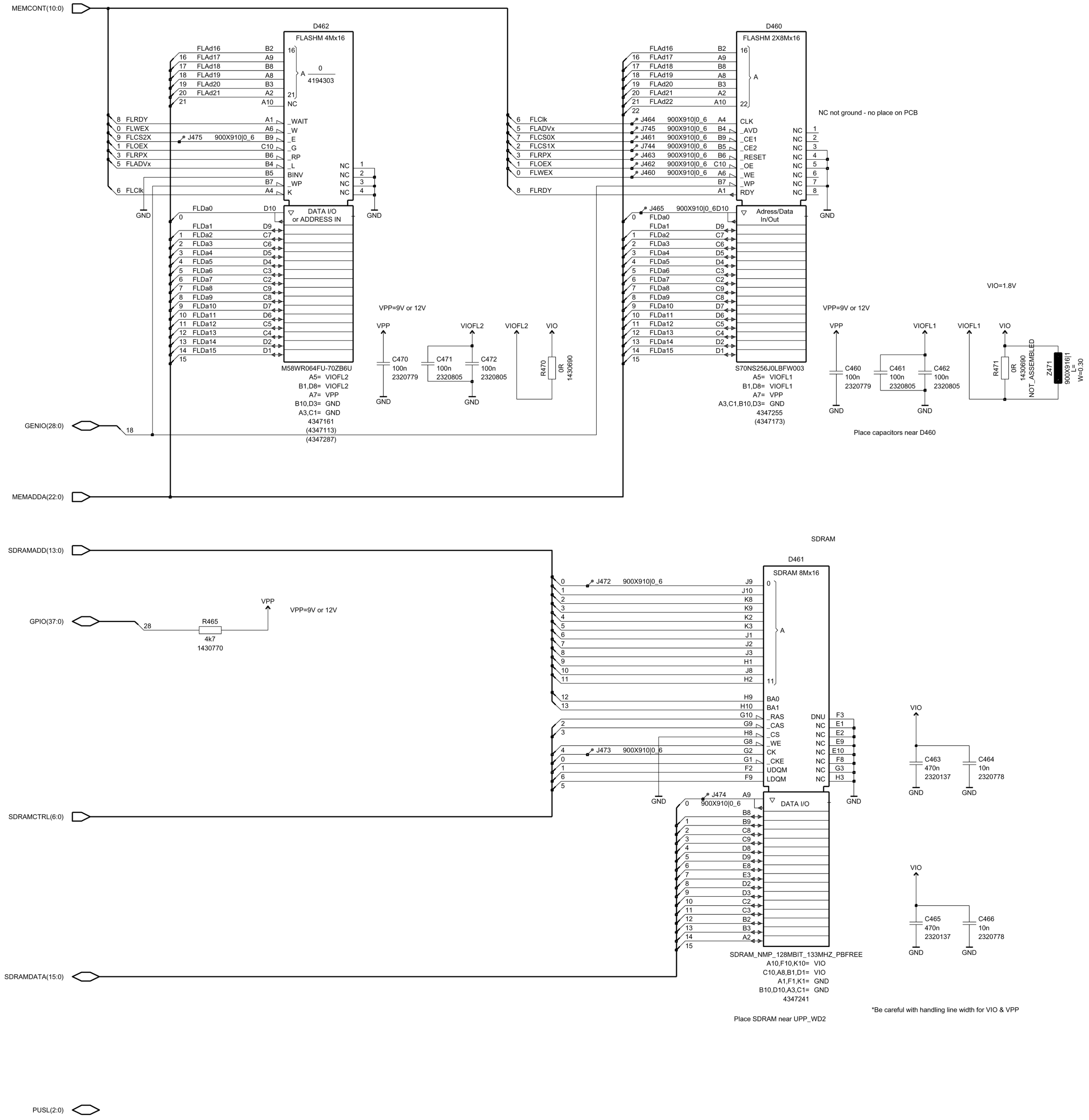
USB module, 1kma_10

Version 7.3, Edit 67


USB_WAKE_UP
USB_SUSPEND
MEMCONT(10:0)
USB_RESETX
USB_VBUS_ON
USB_INT
MEMADDA(22:0)
D440
WAKEUP
SUSPEND
_RD
_CS
_WR
A0
_RESET
_VBUSON
_INT
D0
D1
D2
D3
D4
D5
D6
D7
VBUS
DM
DP
XTAL1
XTAL2
TEST
TEST_LOW
Vreg(3.3)
VDD(1V8)
VDD(1V8)
VDD
DGND
DGND
DGND
AGND
KAEDE_V1.0
BOT_SURF=GND
4342163
B440
MURATA Ceralock
6MHz
4530007
GND
C444 place as near D440 as possible
C444
1u0
2320125
R452
220k
1430812
C443
100n
2320805
C440
100n
2320805
C441
100n
2320805
C442
100n
2320805
C935
22p
2320544
R442
0R
1430690
NOT_ASSEMBLED
VIO
R440
0R
1430690
NOT_ASSEMBLED
R446
33R
1430714
R451
R4
R3
R2
R1
GND
EMIF02-USB02F2
4129265
R448
68R
1430722
R447
68R
1430722
R450
15V/50V
1825233
L440
240R/100MHz
3203767
L441
56nH
3646075
L442
56nH
3646075
C445
22p
2320544
C446
22p
2320544
C447
22p
2320544
HEADINT2EMIF 7
VBUS 2
D- 4
D+ 3
XAUDIO(17:0)
VAUX2
SYS_CON(11:0)

Memories, 1kma_10

Version 6.0, Edit 76

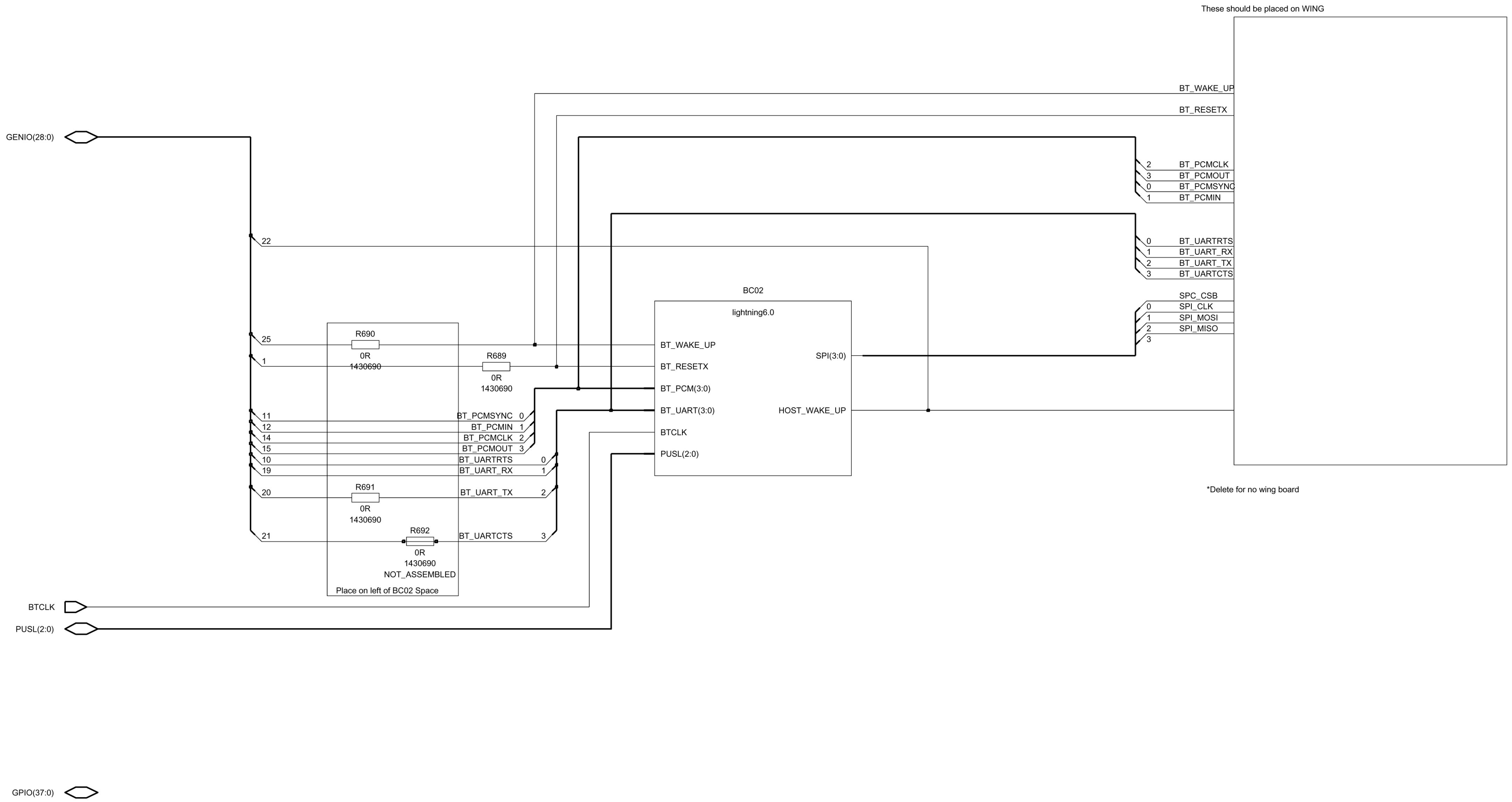

MEMCONT(10:0)
GENIO(28:0)
MEMADDA(22:0)
SDRAMADD(13:0)
GPIO(37:0)
SDRAMCTRL(6:0)
SDRAMDATA(15:0)
PUSL(2:0)
D462
FLASHM 4Mx16
DATA I/O or ADDRESS IN
M58WR064FU-70ZB6U
A5= VIOFL2
B1,D8= VIOFL2
A7= VPP
B10,D3= GND
A3,C1= GND
4347161
(4347113)
(4347287)
D460
FLASHM 2X8Mx16
Adress/Data In/Out
S70NS256J0LBFW003
A5= VIOFL1
B1,D8= VIOFL1
A7= VPP
A3,C1,B10,D3= GND
4347255
(4347173)
NC not ground - no place on PCB
VPP=9V or 12V
VPP
VIOFL2
VIO
C470 100n 2320779
C471 100n 2320805
C472 100n 2320805
R470 0R 1430690
VIOFL1
C460 100n 2320779
C461 100n 2320805
C462 100n 2320805
R471 0R 1430690 NOT_ASSEMBLED
Z471 900X916|1 L W=0,30
VIO=1.8V
Place capacitors near D460
GND
SDRAM
D461
SDRAM 8Mx16
DATA I/O
SDRAM_NMP_128MBIT_133MHZ_PBFREE
A10,F10,K10= VIO
C10,A8,B1,D1= VIO
A1,F1,K1= GND
B10,D10,A3,C1= GND
4347241
Place SDRAM near UPP_WD2
R465 4k7 1430770
VPP=9V or 12V
C463 470n 2320137
C464 10n 2320778
C465 470n 2320137
C466 10n 2320778
*Be careful with handling line width for VIO & VPP

VPP	D462	D460
9V	4347113 Samsung	4347173 Samsung
12V	4347287 AMD	4347255 AMD
12V	4347161 ST	4347255 AMD

4347241 Multi-Source Code	
4347179 Samsung	4347335 (434B469) Micro

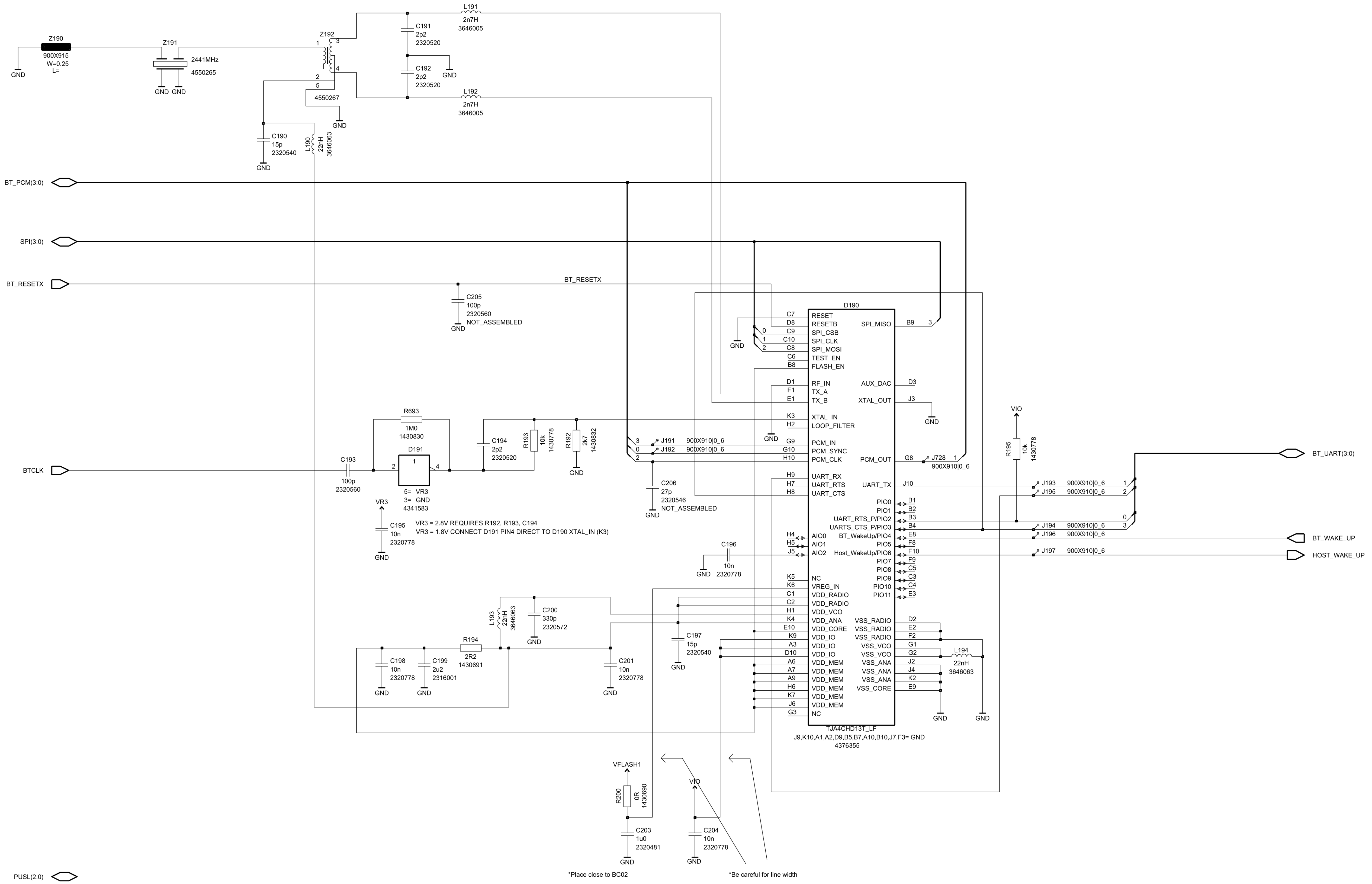
Bluetooth, 1kma_10

Version 7.3, Edit 64


These should be placed on WING
BT_WAKE_UP
BT_RESETX
GENIO(28:0)
2 BT_PCMCLK
3 BT_PCMOUT
0 BT_PCMSYNC
1 BT_PCMIN
22
0 BT_UARTRTS
1 BT_UART_RX
2 BT_UART_TX
3 BT_UARTCTS
SPC_CSB
0 SPI_CLK
1 SPI_MOSI
2 SPI_MISO
3
BC02
lightning6.0
R690
25
0R
1430690
1
R689
0R
1430690
BT_WAKE_UP
BT_RESETX
BT_PCM(3:0)
BT_UART(3:0)
BTCLK
PUSL(2:0)
SPI(3:0)
HOST_WAKE_UP
11 BT_PCMSYNC 0
12 BT_PCMIN 1
14 BT_PCMCLK 2
15 BT_PCMOUT 3
10 BT_UARTRTS 0
19 BT_UART_RX 1
R691
20 BT_UART_TX 2
0R
1430690
R692
21 BT_UARTCTS 3
0R
1430690
NOT_ASSEMBLED
Place on left of BC02 Space
*Delete for no wing board
BTCLK
PUSL(2:0)
GPIO(37:0)

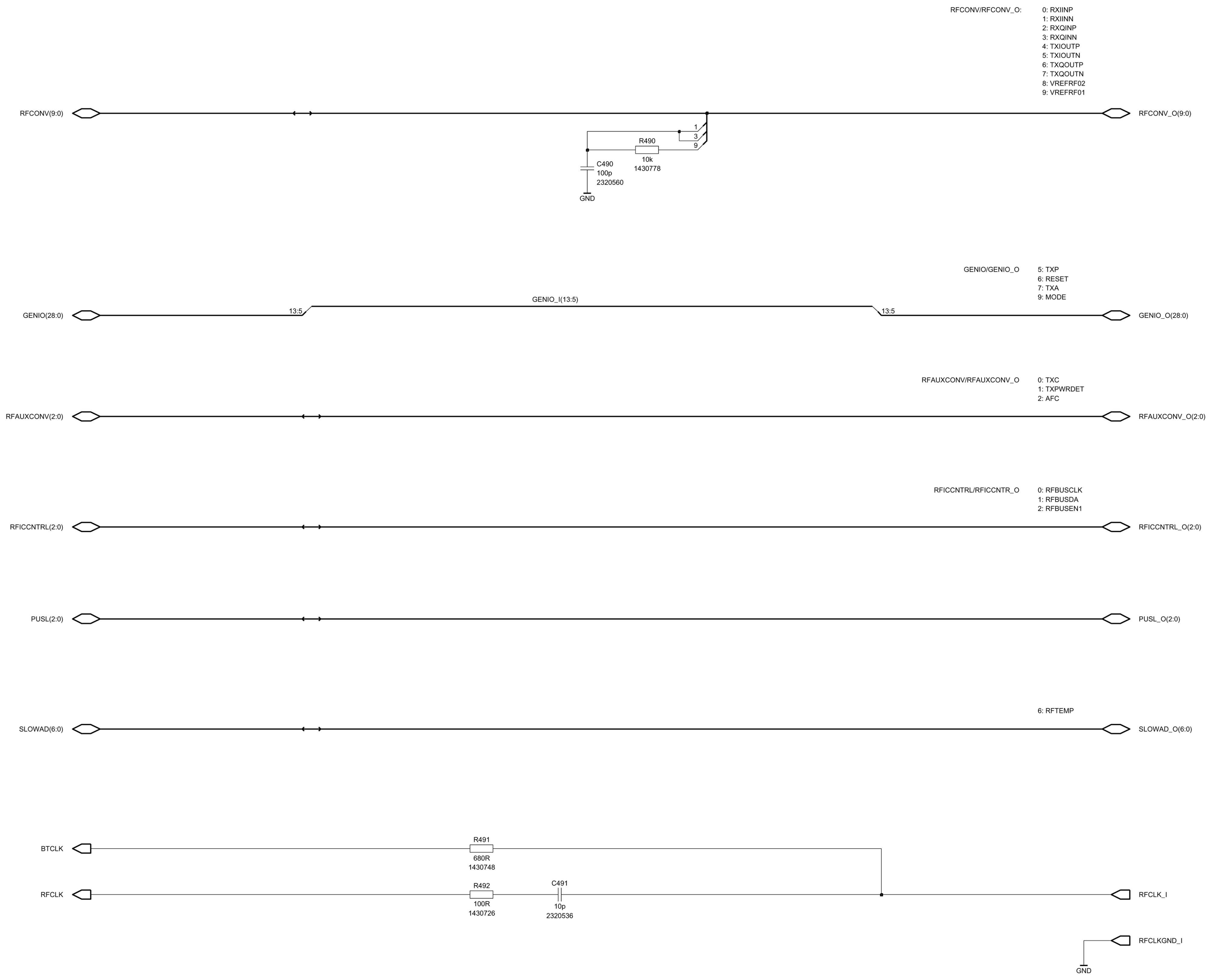
Bluetooth module, 1kma_10

Version 6.0, Edit 76


Z190
900X915
W=0.25
L=
GND
Z191
2441MHz
4550265
GND GND
Z192
4550267
GND
C190
15p
2320540
L190
22nH
3646063
C191
2p2
2320520
C192
2p2
2320520
GND
L191
2n7H
3646005
L192
2n7H
3646005
BT_PCM(3:0)
SPI(3:0)
BT_RESETX
BT_RESETX
C205
100p
2320560
NOT_ASSEMBLED
GND
D190
RESET
RESETB
SPI_CSB
SPI_CLK
SPI_MOSI
TEST_EN
FLASH_EN
RF_IN
TX_A
TX_B
XTAL_IN
LOOP_FILTER
PCM_IN
PCM_SYNC
PCM_CLK
UART_RX
UART_RTS
UART_CTS
AIO0
AIO1
AIO2
NC
VREG_IN
VDD_RADIO
VDD_RADIO
VDD_VCO
VDD_ANA
VDD_CORE
VDD_IO
VDD_IO
VDD_IO
VDD_MEM
VDD_MEM
VDD_MEM
VDD_MEM
VDD_MEM
VDD_MEM
NC
SPI_MISO
AUX_DAC
XTAL_OUT
PCM_OUT
UART_TX
PIO0
PIO1
UART_RTS_P/PIO2
UARTS_CTS_P/PIO3
BT_WakeUp/PIO4
PIO5
Host_WakeUp/PIO6
PIO7
PIO8
PIO9
PIO10
PIO11
VSS_RADIO
VSS_RADIO
VSS_RADIO
VSS_VCO
VSS_VCO
VSS_ANA
VSS_ANA
VSS_ANA
VSS_CORE
TJA4CHD13T_LF
J9,K10,A1,A2,D9,B5,B7,A10,B10,J7,F3= GND
4376355
R693
1M0
1430830
D191
5= VR3
3= GND
4341583
C193
100p
2320560
BTCLK
VR3
C195
10n
2320778
GND
VR3 = 2.8V REQUIRES R192, R193, C194
VR3 = 1.8V CONNECT D191 PIN4 DIRECT TO D190 XTAL_IN (K3)
C194
2p2
2320520
R193
10k
1430778
R192
2k7
1430832
GND
J191 900X910|0_6
J192 900X910|0_6
C206
27p
2320546
NOT_ASSEMBLED
GND
J728
900X910|0_6
VIO
R195
10k
1430778
BT_UART(3:0)
J193 900X910|0_6
J195 900X910|0_6
J194 900X910|0_6
J196 900X910|0_6
J197 900X910|0_6
BT_WAKE_UP
HOST_WAKE_UP
C196
10n
2320778
GND
L193
22nH
3646063
C200
330p
2320572
GND
R194
2R2
1430691
C198
10n
2320778
C199
2u2
2316001
C201
10n
2320778
GND
C197
15p
2320540
GND
L194
22nH
3646063
GND
VFLASH1
R200
0R
1430690
C203
1u0
2320481
GND
VIO
C204
10n
2320778
GND
*Place close to BC02
*Be careful for line width
PUSL(2:0)

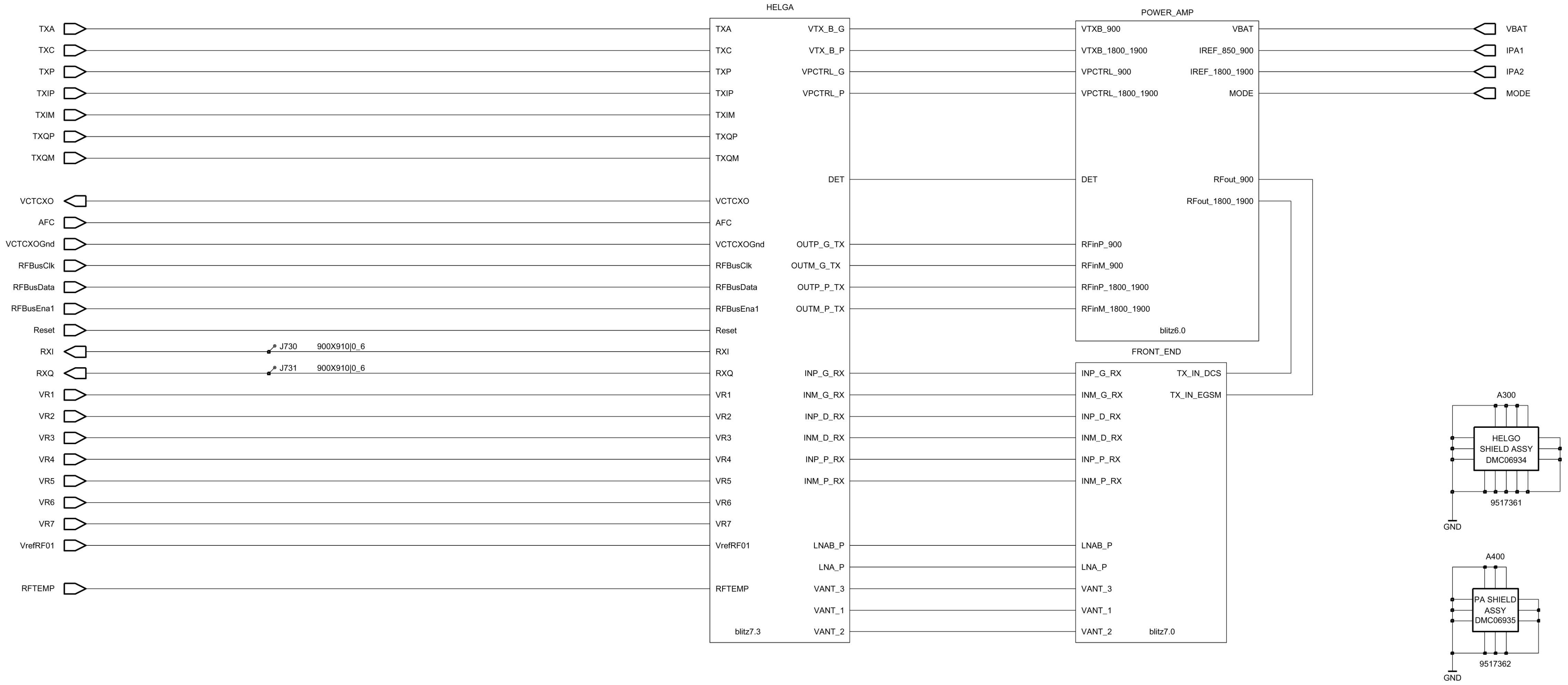
GSM BB-RF interface, 1kma_10

Version 11.0, Edit 17


RFCONV/RFCONV_O:
0: RXIINP
1: RXIINN
2: RXQINP
3: RXQINN
4: TXIOUTP
5: TXIOUTN
6: TXQOUTP
7: TXQOUTN
8: VREFRF02
9: VREFRF01
RFCONV(9:0)
RFCONV_O(9:0)
1
3
9
R490
10k
1430778
C490
100p
2320560
GND
GENIO/GENIO_O
5: TXP
6: RESET
7: TXA
9: MODE
GENIO_I(13:5)
GENIO(28:0)
13:5
13:5
GENIO_O(28:0)
RFAUXCONV/RFAUXCONV_O
0: TXC
1: TXPWRDET
2: AFC
RFAUXCONV(2:0)
RFAUXCONV_O(2:0)
RFICCNTRL/RFICCNTR_O
0: RFBUSCLK
1: RFBUSDA
2: RFBUSEN1
RFICCNTRL(2:0)
RFICCNTRL_O(2:0)
PUSL(2:0)
PUSL_O(2:0)
6: RFTEMP
SLOWAD(6:0)
SLOWAD_O(6:0)
BTCLK
R491
680R
1430748
RFCLK
R492
100R
1430726
C491
10p
2320536
RFCLK_I
RFCLKGND_I
GND

RF top level, 1kma_10

Version 7.3, Edit 85


HELGA
TXA
TXC
TXP
TXIP
TXIM
TXQP
TXQM
VCTCXO
AFC
VCTCXOGnd
RFBusClk
RFBusData
RFBusEna1
Reset
RXI
RXQ
VR1
VR2
VR3
VR4
VR5
VR6
VR7
VrefRF01
RFTEMP
J730 900X910|0_6
J731 900X910|0_6
VTX_B_G
VTX_B_P
VPCTRL_G
VPCTRL_P
DET
OUTP_G_TX
OUTM_G_TX
OUTP_P_TX
OUTM_P_TX
INP_G_RX
INM_G_RX
INP_D_RX
INM_D_RX
INP_P_RX
INM_P_RX
LNAB_P
LNA_P
VANT_3
VANT_1
VANT_2
blitz7.3
POWER_AMP
VTXB_900
VTXB_1800_1900
VPCTRL_900
VPCTRL_1800_1900
DET
RFinP_900
RFinM_900
RFinP_1800_1900
RFinM_1800_1900
VBAT
IREF_850_900
IREF_1800_1900
MODE
RFout_900
RFout_1800_1900
blitz6.0
FRONT_END
INP_G_RX
INM_G_RX
INP_D_RX
INM_D_RX
INP_P_RX
INM_P_RX
LNAB_P
LNA_P
VANT_3
VANT_1
VANT_2
TX_IN_DCS
TX_IN_EGSM
blitz7.0
VBAT
IPA1
IPA2
MODE
A300
HELGO SHIELD ASSY DMC06934
9517361
GND
A400
PA SHIELD ASSY DMC06935
9517362
GND

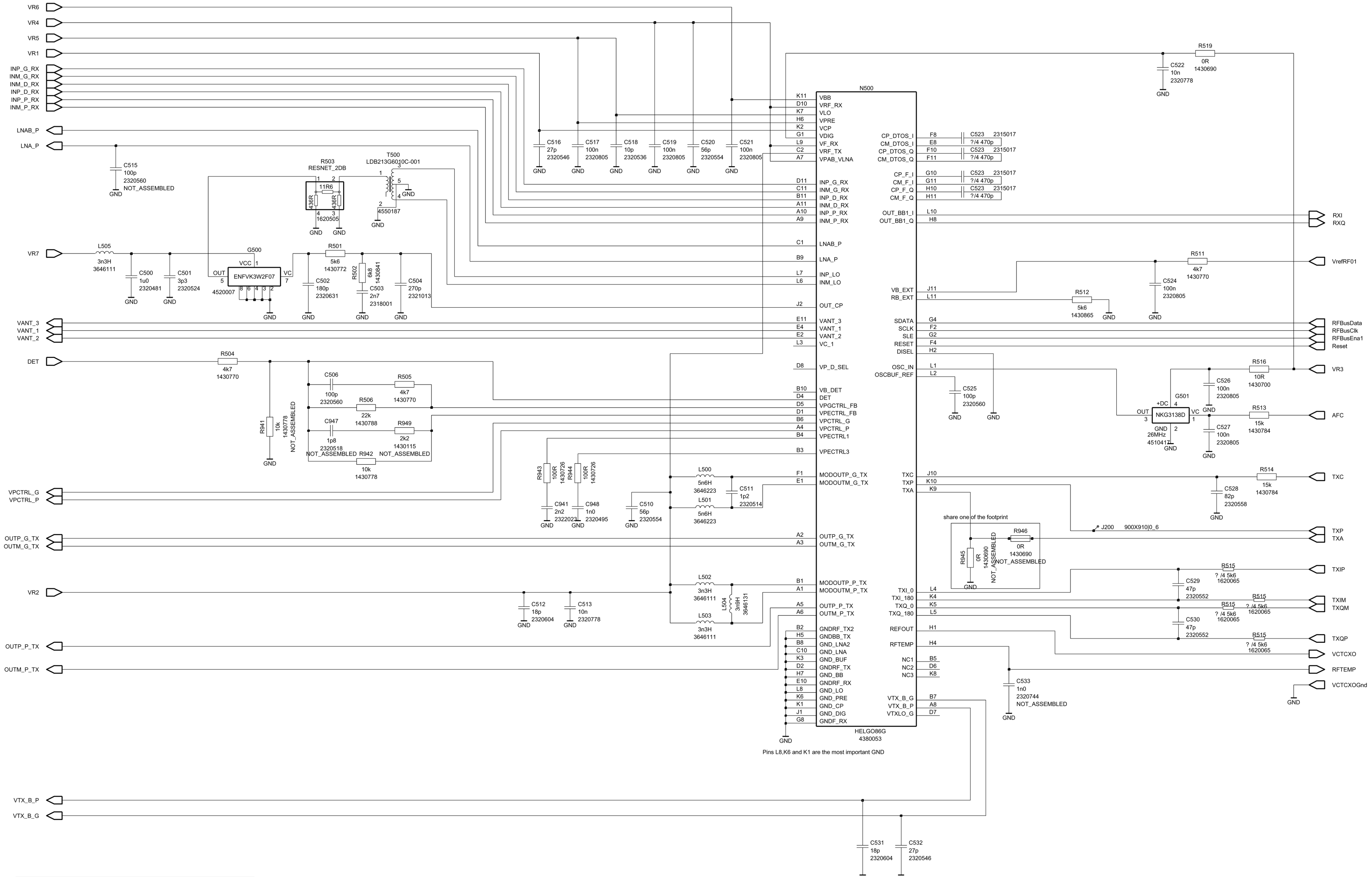
	850	900
Z803 (RX)	4511449	4511455
Z700 (TX)	4511445	4511443

About C511 (Default "EU" version)

EU	1P2 (2320514)
US	1p5 (2320516)

■ HELGO, 1kma_10

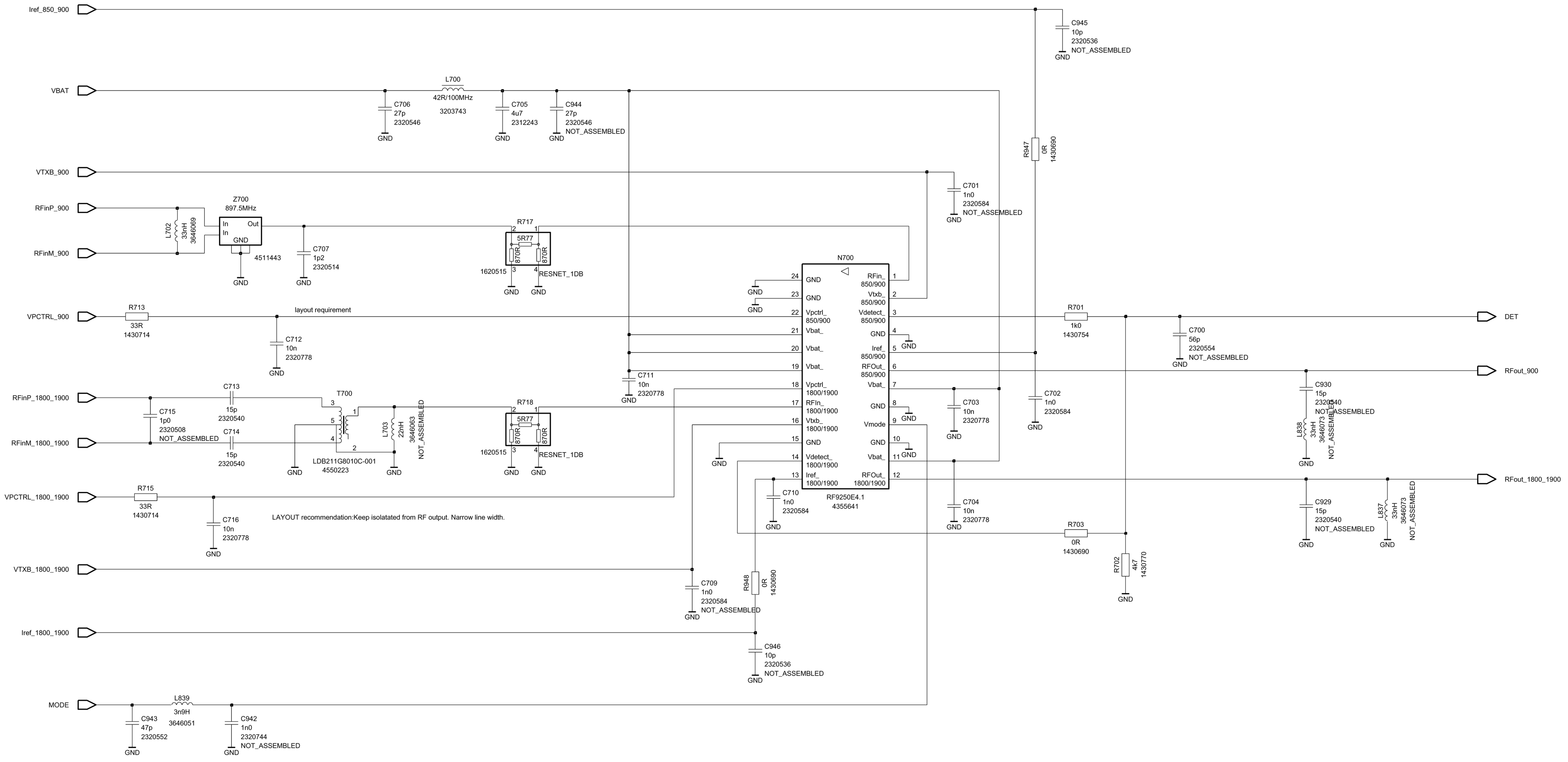
Version 7.3, Edit 98


VR6
VR4
VR5
VR1
INP_G_RX
INM_G_RX
INM_D_RX
INP_D_RX
INP_P_RX
INM_P_RX
LNAB_P
LNA_P
C515
100p
2320560
NOT_ASSEMBLED
GND
R503
RESNET_2DB
11R6
36R
1620505
T500
LDB213G6010C-001
4550187
VR7
L505
3n3H
3646111
C500
1u0
2320481
C501
3p3
2320524
G500
VCC
OUT
ENFVK3W2F07
VC
4520007
R501
5k6
1430772
C502
180p
2320631
R502
6k8
1430841
C503
2n7
2318001
C504
270p
2321013
VANT_3
VANT_1
VANT_2
DET
R504
4k7
1430770
R941
10k
1430778
NOT_ASSEMBLED
C506
100p
2320560
R505
4k7
1430770
R506
22k
1430788
C947
1p8
2320518
NOT_ASSEMBLED
R949
2k2
1430115
NOT_ASSEMBLED
R942
10k
1430778
VPCTRL_G
VPCTRL_P
R943
100R
1430726
R944
100R
1430726
C941
2n2
2322023
C948
1n0
2320495
C510
56p
2320554
L500
5n6H
3646223
L501
5n6H
3646223
C511
1p2
2320514
OUTP_G_TX
OUTM_G_TX
VR2
C512
18p
2320604
C513
10n
2320778
L502
3n3H
3646111
L504
3n9H
3646131
L503
3n3H
3646111
OUTP_P_TX
OUTM_P_TX
C516
27p
2320546
C517
100n
2320805
C518
10p
2320536
C519
100n
2320805
C520
56p
2320554
C521
100n
2320805
N500
VBB
VRF_RX
VLO
VPRE
VCP
VDIG
VF_RX
VRF_TX
VPAB_VLNA
INP_G_RX
INM_G_RX
INP_D_RX
INM_D_RX
INP_P_RX
INM_P_RX
LNAB_P
LNA_P
INP_LO
INM_LO
OUT_CP
VANT_3
VANT_1
VANT_2
VC_1
VP_D_SEL
VB_DET
DET
VPGCTRL_FB
VPECTRL_FB
VPCTRL_G
VPCTRL_P
VPECTRL1
VPECTRL3
MODOUTP_G_TX
MODOUTM_G_TX
OUTP_G_TX
OUTM_G_TX
MODOUTP_P_TX
MODOUTM_P_TX
OUTP_P_TX
OUTM_P_TX
GNDRF_TX2
GNDBB_TX
GND_LNA2
GND_LNA
GND_BUF
GNDRF_TX
GND_BB
GNDRF_RX
GND_LO
GND_PRE
GND_CP
GND_DIG
GNDF_RX
HELGO86G
4380053
Pins L8,K6 and K1 are the most important GND
CP_DTOS_I
CM_DTOS_I
CP_DTOS_Q
CM_DTOS_Q
CP_F_I
CM_F_I
CP_F_Q
CM_F_Q
C523
2315017
?/4 470p
OUT_BB1_I
OUT_BB1_Q
RXI
RXQ
R519
0R
1430690
C522
10n
2320778
R511
4k7
1430770
VrefRF01
C524
100n
2320805
VB_EXT
RB_EXT
R512
5k6
1430865
SDATA
SCLK
SLE
RESET
DISEL
RFBusData
RFBusClk
RFBusEna1
Reset
OSC_IN
OSCBUF_REF
C525
100p
2320560
R516
10R
1430700
VR3
C526
100n
2320805
G501
NKG3138D
26MHz
4510413
R513
15k
1430784
AFC
C527
100n
2320805
TXC
TXP
TXA
R514
15k
1430784
C528
82p
2320558
share one of the footprint
J200
900X910|0_6
R946
0R
1430690
NOT_ASSEMBLED
R945
0R
1430690
NOT_ASSEMBLED
TXP
TXA
TXI_0
TXI_180
TXQ_0
TXQ_180
R515
? /4 5k6
1620065
C529
47p
2320552
C530
47p
2320552
TXIP
TXIM
TXQM
TXQP
REFOUT
RFTEMP
VCTCXO
RFTEMP
VCTCXOGnd
NC1
NC2
NC3
C533
1n0
2320744
NOT_ASSEMBLED
VTX_B_G
VTX_B_P
VTXLO_G
VTX_B_P
VTX_B_G
C531
18p
2320604
C532
27p
2320546
GND

	US Variant	EU Variant
C511	2320516	2320514

RF9250 power amplifier and power detection, 1kma_10

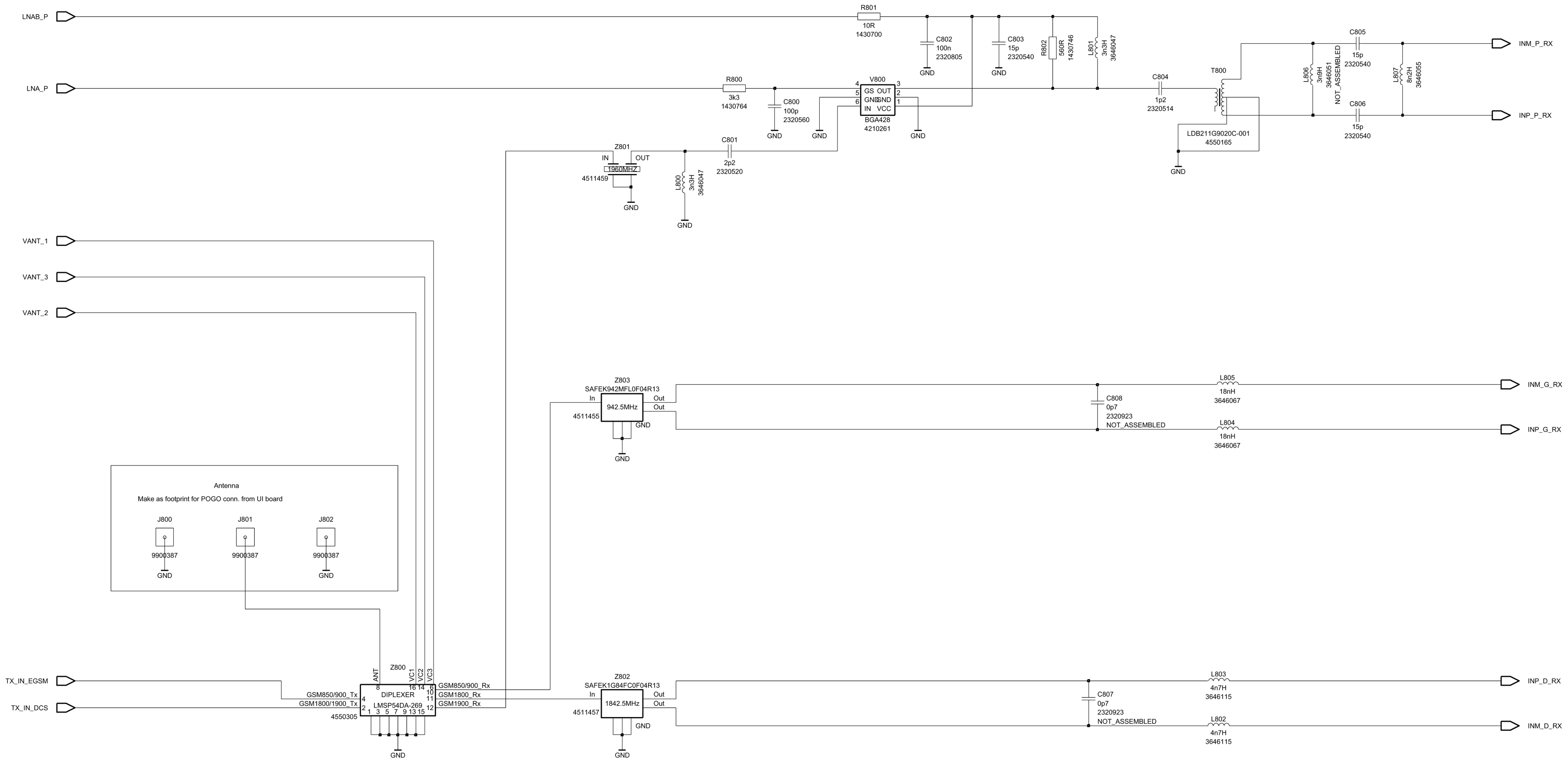
Version 6.0, Edit 87


Iref_850_900
C945
10p
2320536
NOT_ASSEMBLED
GND
VBAT
L700
42R/100MHz
3203743
C706
27p
2320546
C705
4u7
2312243
C944
27p
2320546
NOT_ASSEMBLED
R947
0R
1430690
VTXB_900
C701
1n0
2320584
NOT_ASSEMBLED
RFinP_900
RFinM_900
L702
33nH
3646069
Z700
897.5MHz
In
Out
In
GND
4511443
C707
1p2
2320514
R717
5R77
870R
870R
1620515
RESNET_1DB
N700
GND
Vpctrl_ 850/900
Vbat_
Vpctrl_ 1800/1900
RFIn_ 1800/1900
Vtxb_ 1800/1900
Vdetect_ 1800/1900
Iref_ 1800/1900
RFin_ 850/900
Vtxb_ 850/900
Vdetect_ 850/900
Iref_ 850/900
RFOut_ 850/900
Vmode
RFOut_ 1800/1900
RF9250E4.1
4355641
VPCTRL_900
R713
33R
1430714
layout requirement
C712
10n
2320778
C711
10n
2320778
R701
1k0
1430754
DET
C700
56p
2320554
NOT_ASSEMBLED
C702
1n0
2320584
RFout_900
C930
15p
2320540
NOT_ASSEMBLED
L838
33nH
3646073
NOT_ASSEMBLED
RFinP_1800_1900
RFinM_1800_1900
C713
15p
2320540
C715
1p0
2320508
NOT_ASSEMBLED
C714
15p
2320540
T700
LDB211G8010C-001
4550223
L703
22nH
3646063
NOT_ASSEMBLED
R718
5R77
1620515
RESNET_1DB
C703
10n
2320778
VPCTRL_1800_1900
R715
33R
1430714
C716
10n
2320778
LAYOUT recommendation:Keep isolatated from RF output. Narrow line width.
C710
1n0
2320584
C704
10n
2320778
R703
0R
1430690
R702
4k7
1430770
RFout_1800_1900
C929
15p
2320540
NOT_ASSEMBLED
L837
33nH
3646073
NOT_ASSEMBLED
VTXB_1800_1900
C709
1n0
2320584
NOT_ASSEMBLED
R948
0R
1430690
Iref_1800_1900
C946
10p
2320536
NOT_ASSEMBLED
MODE
L839
3n9H
3646051
C943
47p
2320552
C942
1n0
2320744
NOT_ASSEMBLED
GND

	US Variant	EU Variant
Z700 TX	4511445	4511443

RX front and antenna switch, 1kma_10

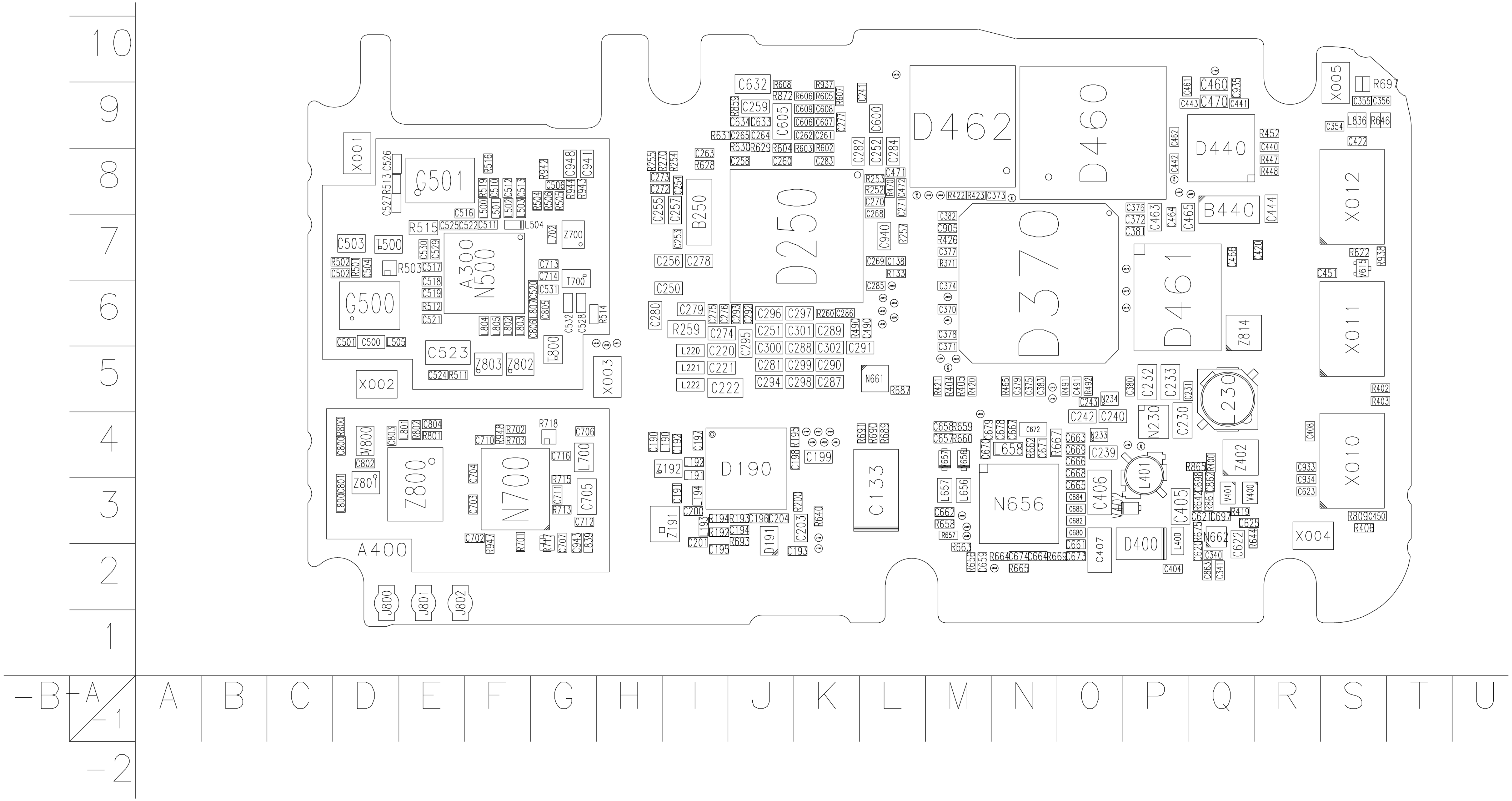
Version 7.0, Edit 82


LNAB_P
R801
10R
1430700
C802
100n
2320805
GND
C803
15p
2320540
GND
R802
560R
1430746
L801
3n3H
3646047
LNA_P
R800
3k3
1430764
C800
100p
2320560
GND
GND
V800
GS OUT
GND GND
IN VCC
BGA428
4210261
GND
C804
1p2
2320514
T800
LDB211G9020C-001
4550165
GND
L806
3n9H
3646051
NOT_ASSEMBLED
C805
15p
2320540
L807
8n2H
3646055
C806
15p
2320540
INM_P_RX
INP_P_RX
Z801
IN
OUT
1960MHZ
4511459
GND
L800
3n3H
3646047
GND
C801
2p2
2320520
VANT_1
VANT_3
VANT_2
Z803
SAFEK942MFL0F04R13
In
Out
Out
942.5MHz
4511455
GND
GND
C808
0p7
2320923
NOT_ASSEMBLED
L805
18nH
3646067
L804
18nH
3646067
INM_G_RX
INP_G_RX
Antenna
Make as footprint for POGO conn. from UI board
J800
J801
J802
9900387
9900387
9900387
GND
GND
TX_IN_EGSM
TX_IN_DCS
Z800
ANT
VC1
VC2
VC3
GSM850/900_Tx
GSM1800/1900_Tx
DIPLEXER
LMSP54DA-269
4550305
GSM850/900_Rx
GSM1800_Rx
GSM1900_Rx
GND
Z802
SAFEK1G84FC0F04R13
In
Out
Out
1842.5MHz
4511457
GND
GND
C807
0p7
2320923
NOT_ASSEMBLED
L803
4n7H
3646115
L802
4n7H
3646115
INP_D_RX
INM_D_RX

	US Variant	EU Variant
Z803 (RX)	4511449	4511455

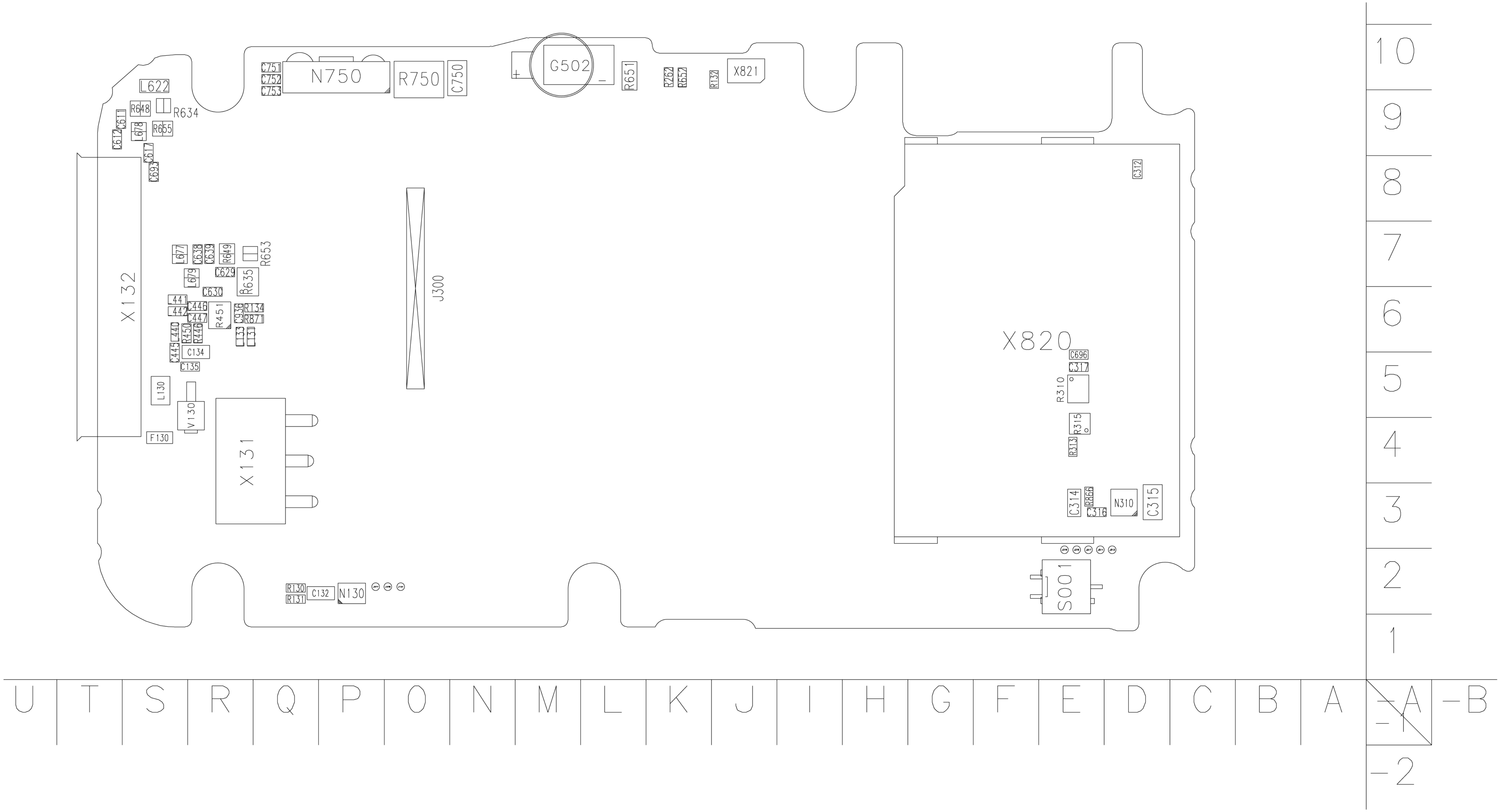
Component layout, top

1kma_10a


10
9
8
7
6
5
4
3
2
1
-1
-2
-B
-A
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
X001
G501
G500
A300
N500
C523
Z803
Z802
X002
X003
A400
Z800
N700
L700
J800
J801
J802
D250
B250
C632
D190
Z191
Z192
C133
D462
D460
D440
B440
D370
D461
Z814
N661
N656
N230
230
L401
C406
C405
D400
Z402
N662
X004
X005
X012
X011
X010
R697

Component layout, bottom

1kma_10a


L622
R648
R634
C611
C612
L678
R655
C617
C693
C751
C752
C753
N750
R750
C750
G502
+
_
R651
R262
R652
R132
X821
X132
L677
C638
C639
R649
R653
L679
C629
R635
C630
L441
L442
C446
C447
R451
C936
R134
R871
L440
R450
R446
L133
L131
C445
C134
C135
L130
V130
F130
X131
J300
X820
C312
C696
C317
R310
R315
R313
C314
R866
C316
N310
C315
S001
R130
R131
C132
N130
10
9
8
7
6
5
4
3
2
1
-1
-2
U
T
S
R
Q
P
O
N
M
L
K
J
I
H
G
F
E
D
C
B
A
-A
-B

Glossary

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Table 13

A/D-converter	Analog-to-digital converter
ACI	Accessory control interface
ACI	Adjacent channel interference
ADC	Analog-to-digital converter
ADSP	Application DSP (expected to run high level task, see also CDSP)
AGC	Automatic gain control (maintains volume)
ARM	Advanced RISC machines
ARPU	Average revenue per user (per month or per year)
ASIC	Application specific integrated circuit
ASIP	Application specific interface protector
BB	Baseband
BC02	Bluetooth module made by CSR
BIQUAD	Bi-quadratic (filter function)
BSI	Battery size indicator
BT	Bluetooth
CBus	MCU controlled serial bus connected to UPP, UEME and Zocus
CCP	Compact camera port
CDSP	Cellular DSP (expected to run at low levels, see also ADSP)
CMOS	Complimentary metal-oxide semiconductor circuit (low power consumption)
COF	Chip on foil
COG	Chip on glass
CPU	Central processing unit
CSR	Cambridge silicon radio
CSTN	Color super twisted nematic, see also FSTN
CTSI	Clock timing sleep and interrupt block of Tiku
DBI	Digital battery interface
DBus	DSP controlled serial bus connected between UPP and Helgo
DCT-4	Digital core technology
DP	Data package
DPLL	Digital phase locked loop
DSP	Digital signal processor
DtoS	Differential to single ended
EDGE	Enhanced data rates for global/GSM evaluation

EGSM	Extended GSM
EM	Energy management
EMC	Electromagnetic compability
EMI	Electromagnetic interference
ESD	Electrostatic discharge
FBUS	Nokia specific serial bus
FCI	Functional cover interface
FPS	Flash programming tool
FR	Full rate
FSTN	Film compensated super twisted nematic, see also CSTN
GND	Ground, conductive mass
GPRS	General packet radio service
GSM	Global system for mobile communication
Helgo	RF ASIC, small signal RX, TX and synthesizer blocks
HF	Hands free
HFCM	Handsfree common
HS	Handset
HSCSD	High speed circuit switched data (data transmission connection faster than GSM)
HW	Hardware
I/O	Input/Output
IBAT	Battery current
IC	Integrated circuit
ICHAR	Charger current
IF	Interface
IHF	Integrated hands free
IMEI	International mobile equipment identity
IR	Infrared
IrDA	Infrared data association (Function: IR)
JPEG	Joint photographic experts group (image file format)
LCD	Liquid crystal display
LDO	Low drop out
LED	Light-emitting diode
LPRF	Low power radio frequency (Bluetooth)
MBUS	Nokia specific serial bus
MCU	Micro controller unit

MIC, mic	Microphone
MMC	Multimedia card
NTC	Negative temperature coefficient (temperature sensitive resistor used as a temperature sensor)
OMA	Object management architecture
Opamp	Operational amplifier
PA	Power amplifier
PDA	Pocket data application
PDRAM	Program/Data RAM
Phoenix	Service software tool
PLL	Phase locked loop
PM	(Phone) Permanent memory
PUP	General Purpose IO (PIO), USARTS and Pulse Width Modulators
PURX	Power-up reset
PWB	Printed wiring board (Printed circuit board)
RC-filter	Resistance-Capacitance filter
RF	Radio frequency
RFBUS	Serial control bus For RF
RISC	Reduced instruction-set computer
RSK	Right soft key
RS-MMC	Reduced size multimedia card
RSSI	Receiving signal strength indicator
RST	Reset switch
RTC	Real time clock (provides date and time)
RX	Radio receiver
SARAM	Single access random access memory
SDRAM	Synchronous dynamic random access memory
SIM	Subscriber identity module
SMPS	Switched mode power supply
SNR	Signal-to-noice ratio
SPR	Standard product requirements
STI	Serial trace interface
SW	Software
SWIM	Subscriber/Wallet identification module
TCXO	Temperature controlled oscillator
Tiku	See ASIC

TX	Radio transmitter
UEME	Universal energy management chip (enhanced version)
UEMEK	See UEME
UI	User interface
UPP	Universal phone processor
UPP_WD2	Communicator version of DCT-4 system ASIC
USB	Universal serial bus
VBAT	Battery voltage
VCHAR	Charger voltage
VCO	Voltage controlled oscillator
VCTCXO	Voltage controlled temperature compensated crystal oscillator
VCXO	Voltage controlled crystal oscillator
VSIM	SIM voltage
WD	Watchdog
Zocus	Current sensor (used to monitor the current flow to and from the battery)